VPDES PERMIT FACT SHEET

This document gives pertinent information concerning the reissuance of the VPDES permit listed below. This permit is being processed as a Major, Municipal permit. The effluent limitations contained in this permit will maintain the Water Quality Standards of 9 VAC 25-260-00 et.seq. The discharge results from the operation of a 8.1 MGD activated sludge WWTP consisting of: the old Bluestone STP used as a flow equalization facility during periods of excessive flow; influent pump station with mechanical barscreen; preliminary treatment building housing a mechanical barscreen and a bypass manual barscreen, a dual aerated coarse bubble grit chamber, grit pumps, blowers, a grit cyclone, and a dewatering screw; three primary clarifiers; aeration tanks consisting of six cells operated in the activated sludge - complete mix mode; four secondary clarifiers; three traveling bridge polishing filters; dual gas chlorinators and five baffled chlorine contact tanks; dual sulfonators for dechlorination; six step cascade aerator; sludge gravity thickener; dual sludge vacuum filters; influent doppler flow meter and effluent parshall flume with an ultrasonic flow meter. Final sludge disposal is discussed in item 10 below.

This permit action consists of limiting pH, BOD_5, suspended solids, total residual chlorine, ammonia nitrogen, and dissolved oxygen; including special conditions regarding control of significant dischargers, a whole effluent toxicity testing program, sludge management, and other requirements and special conditions.

SIC Code: 4952

1. Facility Name and Address:
   Bluefield Westside Wastewater Treatment Plant
   203 Parsley Street
   Bluefield, VA 24605

   Facility Location:
   State Rt. 102

2. Permit No. VA0025054
   Existing Expiration Date: March 23, 2014

3. Owner Name and Address:
   The Sanitary Board of Bluefield
   P.O. Box 998
   Bluefield, WV 24701

   Owner Contact:
   Shannon Bailey
   Title: Executive Director
   Telephone No.: (304) 325-3681
   e-mail: sbailey@bluefieldsanitary.org

   Facility Contact:
   Name: James E. Mullins II
   Title: Plant Manager
   Telephone No: (276) 326-2078

4. Reissuance Application Received Date: 09/19/2013
   Reissuance Application Complete Date: 10/07/2013
   Permit Drafted By: Fred M. Wyatt, Fred M. Wyatt SWRO Date: 11/15/2013
   Reviewed By: Steve E. Ortiz, SWRO Date: 12/11/2013

   Public Comment Period Dates: from 01/07/2014 to 02/07/2014

5. Receiving Stream Name: Bluestone River; River Mile: 9-BST069.39 Basin: New River; Subbasin: None; Section: 1g; Class: IV; Special Standards: u
   Latitude/Longitude: $37^0 15'39''$/ $81^0 16'55''$

7-Day, 10-Year Low Flow (7Q10):	2.0 MGD (June - Dec.)
1-Day, 10-Year Low Flow (1Q10):	1.0 MGD (June - Dec.)
7Q10 High Flow:	4.1 MGD (Jan. - May)
1Q10 High Flow:	1.3 MGD (Jan. - May)
30Q10 Flow:	1.7 MGD (June - Dec.)
30Q10 High Flow:	4.1 MGD (Jan. - May)
Harmonic Mean Flow:	13.2 MGD

Tidal? NO

303(D) list? Yes (See Item # 13 below)

6. Operator License Requirements: Class I

7. Reliability Class: I

8. Permit Characterization:
( ) Private ( ) Federal ( ) State (X) POTW ( ) PVOTW
( ) Possible Interstate Effect ( ) Interim Limits in Other Document

9. Attach a schematic of and provide a brief description of the wastewater treatment system.

Discharge Description

OUTFALL NUMBER	DISCHARGE SOURCE (1)	TREATMENT (2)	FLOW (3)
001	Town of Bluefield, VA City of Bluefield, WV Tazewell County, VA	Advanced Tertiary, see description on Page 1 above, first paragraph	8.1 MGD - Final

(1) List operations contributing to flow (2) List treatment units
(3) Design flow

10. Sewage Sludge Use or Disposal: The Sludge Management Plan consists of three options: (1) Transporting the stabilized and dewatered sludge to the Mercer County West Virginia Landfill; (2) Shipping the sludge to the Princeton Sanitary Board Wastewater Treatment Plant, for treatment and blending, which operates under NPDES Permit No. WV0023094; (3) Land application to farm sites in West Virginia.

DEWATERING PROCESS:

1. Primary and secondary sludge is wasted to a gravity thickener for mixing and thickening. ADA WWTP thickened sludge is transported to the Westside Treatment Plant for further treatment.
2. Thickened sludge is stored in aerated holding tanks for further thickening by decanting water. Detention time is from one to five days, with an average of 2.5 days.
3. The decanted thickened sludge is dewatered using two skid mounted Rotary Fan presses with a total of four dewatering chambers.
4. Dewatered sludge is conveyed by conveyor belt to an outside screw conveyor where lime is introduced by a secondary lime feed augar.

5. Lime is used as a conditioning agent. Sufficient time is added to the sludge to increase the pH above 12.0 standard units two hours after addition and no less than 11.5 standard units after 24 hours after lime addition to meet vector attraction requirements.
6. The dewatered sludge has an average percent solids content of 23 percent.
7. Dewatered sludge is hauled by two tandem trucks and transported to disposal sites. Hauling times are from 7 a.m. to 5 p.m. Monday through Friday.
8. Solids and pH analysis are performed on the sludge prior to polymer addition. Moisture content is performed after dewatering to monitor press performance. PH is performed after lime addition and checked again after two hours and once again after 24 hours to verify vector attraction. A detailed sludge analysis is also performed by an independent commercial laboratory on the dewatered sludge. This analysis is currently being done quarterly. The analysis consists of over forty different analyses including a complete range of metals, fecal coliform, all forms of nitrogen, pesticides, herbicides and EP toxicity.
9. Soil analysis and a site survey are performed on each disposal site, as will be outlined in this plan, prior to the application of sludge. All buffer zones are clearly marked on each site.
10. The sludge to be applied is hauled and spread by Sanitary Board of Bluefield personnel on farms located in Mercer County WV. **No sludge is applied in Virginia.** The Sanitary Board of Bluefield owns maintains bucket loaders, spreaders, and tractors solely for the purpose of spreading sludge.
11. During adverse weather conditions the sludge is temporarily stored at the treatment plant on a concrete pad with a drainage line discharging runoff into the treatment plant influent flow. This pad was designed during the original construction of plant for this purpose.

GRIT AND SCREENINGS

Screening removal is accomplished by two different screens within the plant. A 15 mm coarse screen is located prior to the main pump station. The second is a 6 mm screen located on the second floor of preliminary treatment building. Grit removal is accomplished by aerated grit chambers. The settled grit from the two chambers is pumped through a cyclone degritter and dewatering screw. All grit screenings are collected in street dumpsters and allowed to drain and then loaded onto tandem truck and transported to the Mercer County Landfill for ultimate disposal.

SPECIAL WASTE

The Westside Treatment Plant has a specially designed receiving station for septage haulers. All septage quantities received are documented for ph, temperature, gallons received, and hauler. The source of the septage is logged and the septage received is released into a manhole at the Bluestone diversion station and allowed to dilute with incoming influent wastewater and on to the headworks screening and settling in primary clarifiers and then wasted to gravity thickener for normal sludge stabilization and vector attraction reduction prior to dewatering and land application.

SLUDGE QUALITY AND COMPOSITION

1. Type of Sludge Produced:

The facility will produce Class (B) biosolids utilizing Class 1 treatment.

2. Method of Stabilization to meet Class 1 Treatment Requirements:

The Primary method for stabilization is the addition of lime to the sludge after dewatering. The pH is tested after dewatering followed by two hours and 24 hours before the truckload leaves the facility for ultimate disposal.

Criteria for stabilization is verification of biosolids content less than either 1000 MPN fecal coliforms per gram of total sludge or three salmonella, or one virus (PFU) or one helminth egg per four grams of total sludge solids. Testing is done by an independent commercial laboratory using the frequency described on page 10, Table 1, as seen in our most recent laboratory analysis in Appendix 1.

Prior to land application of biosolids, appropriate vector attraction reduction requirements must be met. This will be demonstrated in the following manner. Sludge pH is 12 standard units or more (alkaline addition) for two consecutive hours and remains at 11.5 or higher for 22 additional hours (no further alkaline additions).

11. Discharge Location Description: See attached Bramwell W. VA. - VA. Quadrangle; Number: 115D

12. Material Storage: 2000+ # chlorine cylinders for disinfection of effluent.

13. Ambient Water Quality Information: The 2012 303(D) Report lists mainstream Bluestone River as impaired from the Rt. 460 bridge to the Town of Bluefield public water supply (PWS) intake, from the PWS intake downstream to Wright's Valley Creek confluence, from Wright's Valley Creek confluence downstream to N37 at the Big Branch confluence, and from Big Branch confluence downstream to the West Virginia state line at Yards. The Bluestone tributary, Big Branch is also impaired to it's headwaters. These segments are not supporting the use goals of recreation. The impairment is listed as total Escherichia coli. The impairment was listed as Fecal Coliform in 2002 from the PWS intake for the Town of Bluefield to the Wright's Valley Creek confluence and from the Big Branch confluence downstream to the WV state line. The Report attributes the impairment to rural (residential areas) and sewage discharges in unsewered areas.

Monitoring station data indicates that mainstream Bluestone River is impaired from Wright's Valley Creek confluence downstream to N37 at the Big Branch confluence and from the Big Branch confluence downstream to the West Virginia state line near Yards. This segment is not supporting the aquatic life use goal. The impairment is listed as benthic-macroinvertebrate bio-assessments and the cause is sedimentation/ siltation. The sources are listed as: crop production (crop land or dry land), silviculture activities, and unrestricted cattle access.

A bacterial and sediment TMDL study was completed for the Bluestone River and was approved by EPA on September 20, 2004 and by SWCB on September 7, 2006. The source of the general standard (benthic) impairment was determined to be total suspended solids (TSS). The TMDL has assigned TSS loadings to several permitted facilities, with most of the loading assigned to the Bluefield Westside WWTP. A sediment loading of 73.17 metric tons/year has been assigned to this facility.

Changes to the TMDL Resulting from the September 13, 2006 permit modification: A BOD wasteload allocation stream model for this discharge indicated that the existing BOD_5 concentration limits (mg/l) for the 5.3 MGD facility can be retained for the 8.1 MGD facility. The existing TSS concentration limits, which match the BOD_5 limits, were also retained. Consequently, the mass loadings for both BOD_5 and TSS were increased to 220 kg/d (monthly average, dry season) and 400 kg/d (monthly average, wet season). These TSS loadings result in an annual loading of approximately 108 kg/day (108 metric tons) from the 8.1 MGD WWTP. Therefore, the TMDL was modified to accommodate this expansion and increase in sediment loading. This increase in suspended solids loadings from the Bluefield Westside WWTP resulted in an insignificant increase in the total allocated sediment loads in the TMDL for Bluestone River of approximately 0.6%. This modified TMDL was approved by EPA on September 16, 2006 and by the SWCB on April 28, 2009.

The 2012 303(D) Report further lists the four segments in Bluestone River (in the first paragraph above) as impaired in not supporting the use goal of fish consumption. The impairment is listed as PCB in fish tissue. The impairment is also listed as PCB in the water column in the Bluestone tributaries, Brush Fork and Beaverpond Creek, from the West Virginia state line downstream to their confluences with Bluestone River. The source is inappropriate waste disposal.

In addition, the 2012 303(D) Report lists Bluestone River as impaired from Big Branch confluence downstream to the West Virginia state line at Yards. The segment is not supporting the use goal of fish consumption. The impairment is listed as chlordane in sediment. The fish tissue and sediment sampling stations at 9-BST069.46 and 9-BST066.94 had total chlordane levels detected in the sediment in 2002 above DEQ's screening value. The source is unknown.

14. Antidegradation Review & Comments: Tier I (X) Tier II Tier III
The State Water Control Board's Water Quality Standards includes an antidegradation policy (9 VAC 25-260-30). All state surface waters are

provided one of three levels of antidegradation protection. For Tier 1 or existing use protection, existing uses of the water body and the water quality to protect these uses must be maintained. Tier 2 water bodies have water quality that is better than the water quality standards. Significant lowering of the water quality of Tier 2 waters is not allowed without an evaluation of the economic and social impacts. Tier 3 water bodies are exceptional waters and are so designated by regulatory amendment. The antidegradation policy prohibits new or expanded discharges into exceptional waters. The antidegradation review begins with a Tier determination. Since the receiving stream is listed on the 303(D) Report as impaired, it is considered as Tier I.

15. Site Inspection: Technical inspection on March 14, 2012 by Wade Carrico.

16. Effluent Screening & Limitation Development:

Basis for Effluent Limitations: 8.1 MGD

PARAMETER	BASIS FOR LIMITS *	DISCHARGE LIMITS				MONITORING REQUIREMENTS	
		MONTHLY AVERAGE	WEEKLY AVERAGE	MINIMUM	MAXIMUM	FREQUENCY	SAMPLE TYPE
Flow	NA	NL	NA	NA	NL	Continuous	Totalizing Indicating & Recording
PH	2	NA	NA	6.0 SU	9.0 SU	1/Day	Grab
BOD_5 (June-Dec.)	1,5	7 mg/l 220 kg/d	10 mg/l 310 kg/d	NA	NA	3 Days/Week	24 Hour Composite
BOD_5 (Jan.-May)	1,5	13 mg/l 400 kg/d	20 mg/l 620 kg/d	NA	NA	3 Days/Week	24 Hour Composite
Total Suspended Solids (June -Dec.)	3,4	7 mg/l 220 kg/d	10 mg/l 310 kg/d	NA	NA	3 Days/Week	24 Hour Composite
Total Suspended Solids (Jan.-May)	3,4	13 mg/l 400 kg/d	20 mg/l 620 kg/d	NA	NA	3 Days/Week	24 Hour Composite
Ammonia Nitrogen (June-Dec.)	2,5	2.1 mg/l	2.8 mg/l	NA	NA	3 Days/Week	24 Hour Composite
Ammonia Nitrogen (Jan.-May)	2,5	2.9 mg/l	3.8 mg/l	NA	NA	3 Days/Week	24 Hour Composite
Total Residual Chlorine, mg/l**	2	0.010 mg/l	0.012 mg/l	NA	NA	1 Every 2 Hours	Grab
E.coli, n/100 ml	2	126 (Geometric Mean)	NA	NA	NA	4/Month at 7 day intervals, between 10:00 am and 4:00 pm	Grab
Dissolved Oxygen	2,5	NA	NA	6.5	NA	1/Day	Grab

**1. Federal Effluent guidelines*
2. Water Quality-based Limits:
3. Best Engineering Judgement
4. Best Professional Judgement
5. Other (e.g. wasteload allocation model)

*****Additional TRC Limitations and Monitoring Requirements (PART I.B. of Permit)***

1. The permittee shall monitor the Total Residual Chlorine (TRC) at the outlet of each operating chlorine contact tank, at a frequency of every 2 hours by grab sample.
2. No more than thirty six (36) of all samples for TRC taken at the outlet of each chlorine contact tank shall be less than 1.0 mg/l for any one calendar month.
3. No TRC sample collected at each outlet of the chlorine contact tank shall be less than 0.60 mg/l.
4. If dechlorination facilities exist, the samples above shall be collected prior to dechlorination.
5. If chlorine disinfection is not used, E.coli shall be limited and monitored by the permittee as specified below and this requirement, if applicable, shall substitute for the TRC and E.coli requirements delineated elsewhere in Part I ofthis permit:

	Discharge Limitations Monthly Average	Monitoring Requirement Frequency	Sample Type
E.coli (N/100 ml)	126 (Geometric Mean)	1/Day (Between 10 a.m. & 4 p.m.)	Grab

VPDES Permit was modified on September 13, 2006 to incorporate the effluent Limitations and monitoring Requirements and other conditions for the upgrade/expansion from a 5.3 MGD facility to an 8.1 MGD facility.

Basis for Limits:

1. Water Quality Based Limits

pH: A pH range of 6.0 - 9.0 standard units is assigned to Class IV waters per the Virginia Water Quality Standards.

Ammonia Nitrogen: The ammonia nitrogen limits were re-evaluated for the expansion to 8.1 MGD, based on current Water Quality Standards, stream temperature and pH data.

Total Residual Chlorine: Acute and chronic stream criteria in the Virginia Water Quality Standards were used to calculate acute and chronic wasteload allocations (WLAs) and these WLAs were used in Stats.exe Version 2.0.4 to calculate effluent limitations for the expanded discharge.

E.coli (For alternate disinfection): A geometric mean of 126 n/100 ml is required by the Virginia Water Quality Standards.

BOD_5 and Dissolved Oxygen (DO): In previous permit action, the effluent limitations were re- calculated for the discharge expansion, using the Streeter-Phelps water quality model for free flowing streams. The concentration (mg/l) limits remained the same as for the 5.3 MGD discharge. Only the mass loadings (kg/day) were increased.

Total Suspended Solids (TSS): Based on the allocated sediment loadings for in the TMDL for Bluestone River.

The Expanded Effluent Testing Data, included with the Form 2A reissuance application received 9/19/2013, revealed no violations of water quality standards.

17. Basis for Sludge Use & Disposal Requirements: VPDES Permit Regulation, 9VAC25-31-100 P; 220 B.2.; and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal.

18. Antibacksliding Statement: Since no effluent limitations are being relaxed in this reissuance, antibacksliding provisions of the Permit Regulation (9 VAC 25-31-220.1) do not apply.

19. Compliance Schedules: None

20. Special Conditions:

PART I.B. Special Condition - Additional (TRC) Limitations and Monitoring Requirements
Rationale: Required by Sewage Collection and Treatment Regulations, 9VAC25-790. Also, 40 CFR 122.41(e) requires the permittee, at all times, to properly operate and maintain all facilities and systems of treatment in order to comply with the permit. This ensures proper operation of chlorination equipment to maintain adequate disinfection.

PART I.C. Special Condition - Compliance Reporting
Rationale: Authorized by VPDES Permit Regulation, 9VAC25-31-190J4 and 220 I. This condition is necessary when pollutants are monitored by the permittee and a maximum level of quantification and/or a specific analytical method is required in order to assess compliance with a permit limit or to compare effluent quality with a numeric criterion. The condition also establishes protocols for calculation of reported values.

PART I.D. Special Condition - Control of Significant Dischargers
Rationale: VPDES Permit Regulation, 9VAC25-31-730 through 900, and 40 CFR part 403 require certain existing and new sources of pollution to meet specified regulations.

PART I.E. Special Condition - Whole Effluent Toxicity Testing
Rationale: VPDES Permit Regulation, 9 VAC25-31-210 and 220 I, requires monitoring in the permit to provide for and assure compliance with all applicable requirements of the State Water Control Law and the Clean Water Act.

PART F. Other Requirements and Special Conditions:

1. **95% Capacity Reopener**
Rationale: Required by VPDES Permit Regulation, 9VAC25-31-200 B 4 for all POTW and PVOTW permits

2. **Indirect Dischargers**
Rationale: Required by VPDES Permit Regulation, 9VAC25-31-200 B 1 and B 2 for POTWs and PVOTWs that receive waste from someone other than the owner of the treatment works.

3. **CTC, CTO Requirement**
Rationale: Required by the Code of Virginia § 62.1-44.19: Sewage Collection and Treatment Regulations, 9VAC25-790.

4. **Operation and Maintenance Manual Requirement**
Rationale: Required by the Code of Virginia § 62.1-44.19: Sewage Collection and Treatment Regulations, 9VAC25-790; VPDES Permit Regulation, 9VAC25-31-190 E.

5. **Licensed Operator Requirement**
Rationale: The VPDES Permit Regulation, 9VAC25-31-200 C and the Code of Virginia § 54.1-2300 et seq, Rules and Regulations for Waterworks and Wastewater Works Operators (18VAC160-20-10 et seq.), require licensure of operators.

6. **Reliability Class**
Rationale: Required by the Sewage Collection and Treatment Regulations, 9 VAC25-790 for all municipal facilities.

7. **Treatment Works Closure Plan**
Rationale: State Water Control Law § 62.1-44.19. This condition is used to notify the owner of the need for a closure plan where a treatment works is being replaced or is expected to close.

8. **Section 303(d) List (TMDL) Reopener**
Rationale: Section 303(d) of the Clean Water Act requires the total maximum daily loads (TMDLs) be developed for streams listed as impaired. This special condition is to allow the permit to be reopened if necessary to bring it in compliance with any applicable TMDL approved for the receiving stream. The reopener recognizes that, according to Section 402(o)(1)of the Clean Water Act, limits and/or conditions may be either more or less stringent than those contained in the permit. Specifically, they can be relaxed if they are the result of a TMDL, basin plan, or other wasteload allocation prepared under Section 303 of the Act.

9. **Sludge Reopener**
Rationale: Required by VPDES Permit Regulation, 9VAC25-31-220 C for all permits issued to treatment works treating domestic sewage.

10. **Sludge Use and Disposal**
Rationale: VPDES Permit Regulation, 9VAC25-31-100 P; 220 B.2.; and 420 through 720, and 40 CFR Part 503 require all treatment works treating domestic sewage to submit information on sludge use and disposal practices and to meet specified standards for sludge use and disposal.

11. **Water Quality Criteria Monitoring**
Rationale: State Water Control Law §62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State

waters. States are required to review data on discharges to identify actual or potential toxicity problems, or the attainment of water quality goals, according to 40 CFR Part 131, Water Quality Standards, subpart 131.11. To ensure that water quality criteria are maintained, the permittee is required to analyze the facility's effluent for the substances noted in Attachment A of this VPDES permit.

12. ***PCBs Minimization and Monitoring:***
Rationale: State Water Control Law §62.1-44.21 authorizes the Board to request information needed to determine the discharge's impact on State waters. States are required to review data on discharges to identify actual or potential toxicity problems, or the attainment of water quality goals, according to 40 CFR Part 131, Water Quality Standards, Subpart 131.11.

Assuming a Tier I stream and using a harmonic mean flow of 13.2 MGD and a human health criteria of 640 pg/l, a PCBs WLA of 1,682 pg/l was calculated. Effluent samples have yielded results of 640 pg/l, 3,972 pg/l, and 1,452 pg/l. This data justifies requiring a PMP.

PART II, Conditions Applicable to All Permits
Rationale: VPDES Permit Regulation, 9 VAC 25-31-190 requires all VPDES permits to contain or specifically cite the conditions listed.

20. Changes from the previous permit contained in the reissuance permit:

This permit has been drafted using guidance provided in the January, 2010 permit manual which is updated on a continual basis, resulting in minor changes to permit requirements and conditions.

At the request of the permittee in the reissuance application, the land application option for biosolids, previously included in the VPDES Permit, is not being included in the reissuance permit. Special conditions regarding land application of biosolids, biosolids limitations and monitoring requirements and soil monitoring requirements for land application sites have been removed.

PART I C.1. - The quantification level (QL) for BOD_5 has been changed from 5.0 mg/l to 2 mg/l in accordance with recommendations from the Office of Water Permits and Standard Methods 22_{nd} Edition.

The special condition for submittal of an operations and maintenance manual has been updated and does not require DEQ approval unless requested by DEQ.

The special condition requiring PCBs Minimization and Monitoring has been replaced with a special condition requiring a PCBs Pollutant Minimization Plan.

In accordance with current permit manual guidance, the monitoring frequency for effluent total residual chlorine has been changed from

1/Day to one every two hours and the monitoring frequency for E.coli has been increased from 2/month to 4/month at 7 day intervals.

Water Quality Criteria Monitoring and Attachment A are being included since this testing was not required in the previous permit. Although the permittee completed the PART D. EXPANDED EFFLUENT TESTING in the FORM 2A application, this testing did not include several parameters in the Virginia Water Quality Standards, which the Attachment A does include.

Due to warning letters during the previous permit cycle, the treatment facility does not qualify for reduced monitoring under EPA's Interim Guidance for Performance Based Reductions of NPDES Permit Monitoring Frequencies.

22. Variances/Alternate Limits or Conditions: None

23. Regulation of Users: 9 VAC 25-31-280 B 9 - NA

24. Public Notice Information required by 9 VAC 25-31-280 B:

HOW TO COMMENT AND/OR REQUEST A PUBLIC HEARING: DEQ accepts comments and requests for public hearing by hand delivery, e-mail, fax or postal mail. All comments and requests must be in writing and be received by DEQ during the comment period. Submittals must include the names, mailing addresses and telephone numbers of the commenter/requester and of all the persons represented by the commenter/requester. A request for a public hearing must also include; 1) The reason why a public hearing is requested. 2) A brief, informal statement regarding the nature and extent of the requester or of those represented by the requester, including how and to what extent such interest would be directly and adversely affected by the permit. 3) Specific references, where possible, to terms and conditions of the permit and suggested revisions. A public hearing may be held, including another comment period, if public response is significant, based on individual requests for a public hearing, and there are substantial, disputed issues relevant to the permit.

CONTACT FOR PUBLIC COMMENTS, DOCUMENT REQUESTS AND ADDITIONAL INFORMATION:
Name: Fred M. Wyatt
Address: DEQ, Southwest Regional Office, 355-A Deadmore Street, Abingdon, VA 24210; Phone: (276) 676-4810 E-mail: frederick.wyatt@deq.virginia.gov Fax: (276) 676-4899

The public may review the draft permit and application at the DEQ office named above by appointment, or may request copies of the documents from the contact person listed above.

25. Additional Comments:

Permit Fee: A reissuance application fee is not required, but an annual maintenance fee of $8,292 is required.

Previous Board Action: Effective April 4, 1985, a Consent Decree was issued by the Circuit Court of Tazewell County to the Sanitary Board of Bluefield (Bluefield), on behalf of the SWCB. The Decree imposed a limited moratorium on new connections to the system, required Bluefield to address excessive infiltration/inflow (I/I), comply with the VPDES permit, pay a stipulated penalty for failure to comply with the Decree, and pay a civil penalty of $3,500.00 for previous violations of the VPDES permit and Regulation 6.

Using an EPA grant and its own funds, Bluefield began an extensive I/I abatement program. In spite of these efforts, I/I problems persisted.

Although the new 3.5 MGD WWTP had only been in service since August, 1981, the rotating biological contactors began failing in July, 1984.

Bluefield initially began replacing the broken RBC shafts, but soon suspected that the replacement shafts were defective (used). Bluefield ultimately became convinced that the system design and construction were also defective. Consequently, Bluefield initiated litigation against the manufacturer, engineers, and contractor.

The RBC units continued failing and Bluefield began violating the VPDES permit limits. In 1988, the SWCB referred Bluefield to the Attorney Generals Office to initiate legal action required to collect payment of penalties for violations of the Decree and lack of compliance with the permit. However, due to the language in the decree, the penalty issue remained unresolved and the Decree was not enforced or modified.
On January 20, 1989, a public hearing was conducted by the SWCB regarding the reissuance of the VPDES permit. Bluefield, and several businesses and industries objected to the provisions of the draft permit, chiefly the summer limits for BOD_5 and TSS. Objections centered around the belief that the summer limits were unnecessarily strict and should be relaxed along with the winter limits which were being relaxed. At its March 20, 1989 meeting, the Board reviewed the hearing record and hear comments from SWCB staff and Bluefield representatives. The Board directed the staff to reissue the permit as originally proposed. The Board also directed the staff to modify the Consent Decree to allow a stream modeling study to be conducted by Bluefield and to include interim effluent limitations, effective while the study was being conducted.

In 1991, Bluefield received a court settlement with regard to the RBC units. With this and additional funding, Bluefield initiated a plan which ultimately resulted in the expansion and upgrade from a 3.5 MGD RBC facility to a 5.3 activated sludge facility.

On September 13, 2006, the VPDES Permit was modified to increase the design flow of the treatment system from 5.3 MGD to 8.1 MGD. On October 6, 2006, a certificate to operate was issued for this expansion, which consisted essentially of a hydraulic re-rating of the existing facility.

The Consent Decree that was issued on April 4, 1985 was cancelled in September, 2004.

Permit History: VPDES Permit No. VA0025054 was issued on November 9, 1974, was modified on June 8,1992 and September 13, 2006, was reissued seven times, and has an expiration date of March 23, 2014.

Stormwater: The federal storm water regulations were published by EPA in 2 phases. The Phase 1 regulation was published on November 16, 1990, and established permit application requirements for storm water discharges associated with industrial activity.
On April 2, 1992, EPA published a Federal Register notice which codified several provisions of Section 1068 of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) into the NPDES Regulations. The ISTEA rule temporarily exempted Phase 1 industrial activity storm water discharges owned or operated by municipalities with populations less than 100,000 from the storm water permitting requirements, with the exception of power plants, airports, and uncontrolled sanitary landfills (defined as those not meeting the runon/runoff requirements of Subtitle D of RCRA). Congress delayed the additional time to comply with the NPDES requirements.

The Phase 2 regulation was published on December 8, 1999, and ended the ISTEA exemption. The regulation set a deadline of March 10, 2003, for all ISTEA-exempted municipally owned or operated industrial activities to apply for permit coverage. After that date, all regulated industrial activities and construction projects must comply with the VPDES storm-water permitting requirements, regardless of whether the activity is publicly or privately owned.

The permittee has complied with the Phase 2 requirements by submitting a VIRGINIA DEQ NO EXPOSURE CERTIFICATION FOR EXCLUSION FROM VPDES STORM WATER PERMITTING.

Threatened and Endangered (T&E) Species: The stream segment in which this facility discharges is designated as State Endangered due to the confirmed presence of the Tennessee Heelsplitter (Lasmigona holstonia). This facility is also on the list for review by the Department of Conservation and Recreation (DCR) and the Virginia Department of Game and Inland Fisheries (DGIF) and the T&E Coordination Form is being sent to them.

Public Comments: None

Comments From Adjacent States (Added 03/14/2014): Due to the proximity of the discharge to the West Virginia State line, the draft permit was sent to West Virginia Division of Water and Waste Management (WVDEP). Matthew Sweeney with WVDEP first contacted Fred Wyatt of DEQ-SWRO by phone with questions regarding the pollutant minimization plan (PMP) for PCBs in the draft permit. By conference call on 01/28/2014, the VADEQ Regional Director and water permits staff discussed the PMP with the WVDEP Director and water permits staff. By letter dated January 29, 2014, Scott G. Mandirola, Director of WVDEP commented on the draft permit and PMP. The WVDEP recommended, at a minimum, that routine effluent monitoring for PCB's be imposed in the permit on a quarterly basis. The letter from WVDEP was forwarded (by DEQ) to the Sanitary Board of Bluefield who commented to DEQ on February 3, 2014.

The main points of the Sanitary Board's comments are: *We believe the draft permit establishes the smartest and most cost-effective approach by requiring a combination of collecting-system targeted sampling with some end-of-pipe sampling. In particular, we think a primary focus on collection system sampling for this permit cycle will give us the best information from our PCB testing to try to identify and address any sources/hot spots in our collection system. Effluent monitoring will not provide any information about potential sources. Thus, for this permit cycle, we believe the permit as drafted will provide DEQ and the Sanitary Board with the best information about PCB sources in our system . . . .*

By letter dated February 24, 2014, Mark S. Trent, Water Permit Manager, DEQ-SWRO, responded to the comments from WVDEP. DEQ's response essentially mirrored the comments of the Sanitary Board. DEQ's main point is: *The staff has reviewed the comments and determined that the provisions in the current draft are sufficiently protective of the water quality of the stream and comply with current accepted methods for addressing total PCBs (tPCB) in the waste stream. Therefore, the Department intends to issue the permit as initially proposed.*

26. 303(d) listed segments (TMDL): See Item # 13, above.

PLANNING CONCURRENCE FOR MUNICIPAL VPDES PERMIT

PERMIT NO. VA0025054
FACILITY: Bluefield Westside WWTP
COUNTY: Tazewell

[ ] 1. The discharge is in conformance with the existing planning documents for the area.

[ ] 2. The discharge is not addressed in any planning document but will be included, if required, when the plan is updated.

[ ] 3. Other

____
TMDL Coordinator

____
Date

PLANNING CONCURRENCE FOR MUNICIPAL VPDES PERMIT

PERMIT NO. VA0025054
FACILITY: Bluefield Westside WWTP
COUNTY: Tazewell

[✓] 1. The discharge is in conformance with the existing planning documents for the area.

[ ] 2. The discharge is not addressed in any planning document but will be included, if required, when the plan is updated.

[ ] 3. Other

Martha Chapman
TMDL Coordinator

20 December 2013
Date

ATTACHMENT 1

Treatment Process Diagrams & Description

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
SOUTHWEST REGIONAL OFFICE

L. Preston Bryant, Jr.
Secretary of Natural Resources

Mailing Address: P.O. Box 1688, Abingdon, Virginia 24212-1688
Street Address: 355 Deadmore Street, Abingdon, Virginia 24210
(276) 676-4800 Fax (276) 676-4899
www.deq.virginia.gov

David K. Paylor
Director

Michael D. Overstreet
Regional Director

November 3, 2006

SUBJECT: Tazewell County
Certificate to Operate
Bluefield Westside
Wastewater Treatment Plant
VA0025054

Mr. R. Terry Honaker
Executive Director
Sanitary Board Of Bluefield
Post Office Box 998
Bluefield, West Virginia 24701

Dear Mr. Honaker:

In accordance with Section 790 of the Commonwealth of Virginia *Sewage Collection and Treatment Regulations*, enclosed is a **conditional** Certificate to Operate (CTO) for the above referenced sewage treatment works, located in Tazewell County.

This approval is indicative of approval of the methodology and rationale for the proposed re-rating of the facility to 8.1 MGD. It remains the responsibility of the Owner to meet the required discharge limits. If the performance of the treatment works is reduced to below the design level, then the owner of the treatment works must submit an acceptable plan/program outlining the steps that will be taken to adequately treat the flow.

Correct all deficiencies noted in the September, 2006 DEQ Compliance Inspection.

Should you have any questions, please feel free to contact me by phone at 276-676-4866 or by email at dpscott@deq.virginia.gov.

Sincerely,

Daniel P. Scott

Daniel P. Scott, PE
Area Engineer (Southwest)
Department of Environmental Quality
Office of Wastewater Engineering

c: DEQ-SWRO
Cumberland Plateau Health District - Dr. John Dreyzehner
Tazewell County PSA – Dahmon Ball
T&L – Darrell Stapleton
DEQ-OWE – Archive

CERTIFICATE TO OPERATE

Owner: Sanitary Board of Bluefield

Facility/System Name: Bluefield Westside Wastewater Treatment Plant

VPDES Permit Number: VA0025054

Description of Facility/System: Hydraulic re-rating to 8.1 MGD based upon the "Final Design Report for the Upgrade of the Westside Wastewater Treatment Plant from 5.3 MGD to 8.1 MGD" prepared by Thompson & Litton and PE stamp dated August 9, 2006.

AUTHORIZATION TO OPERATE: The owner is authorized to operate this facility in accordance with Section 790 of the Commonwealth of Virginia *Sewage Collection and Treatment Regulations*.

This authorization is contingent upon meeting the following requirements:

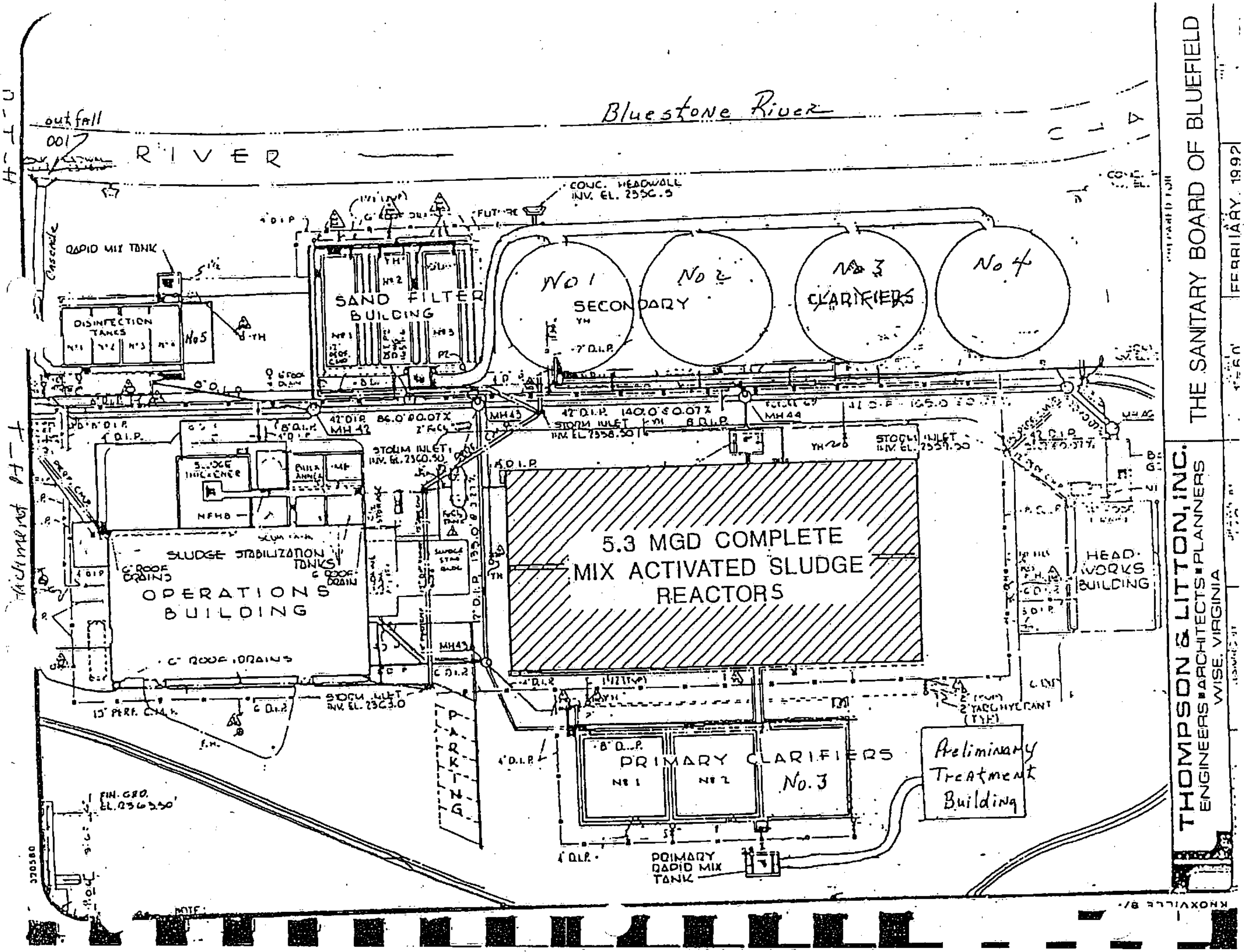
1. If the average influent organic loading significantly exceeds the assumed BOD and the performance of the treatment works diminishes such that the effluent quality exceeds the VPDES limitations for 2 months or more annually, then a plan of action shall be prepared and submitted to this Department and the Department of Environmental Quality for evaluation of additional treatment needs.

Issued By:

David P. Sand

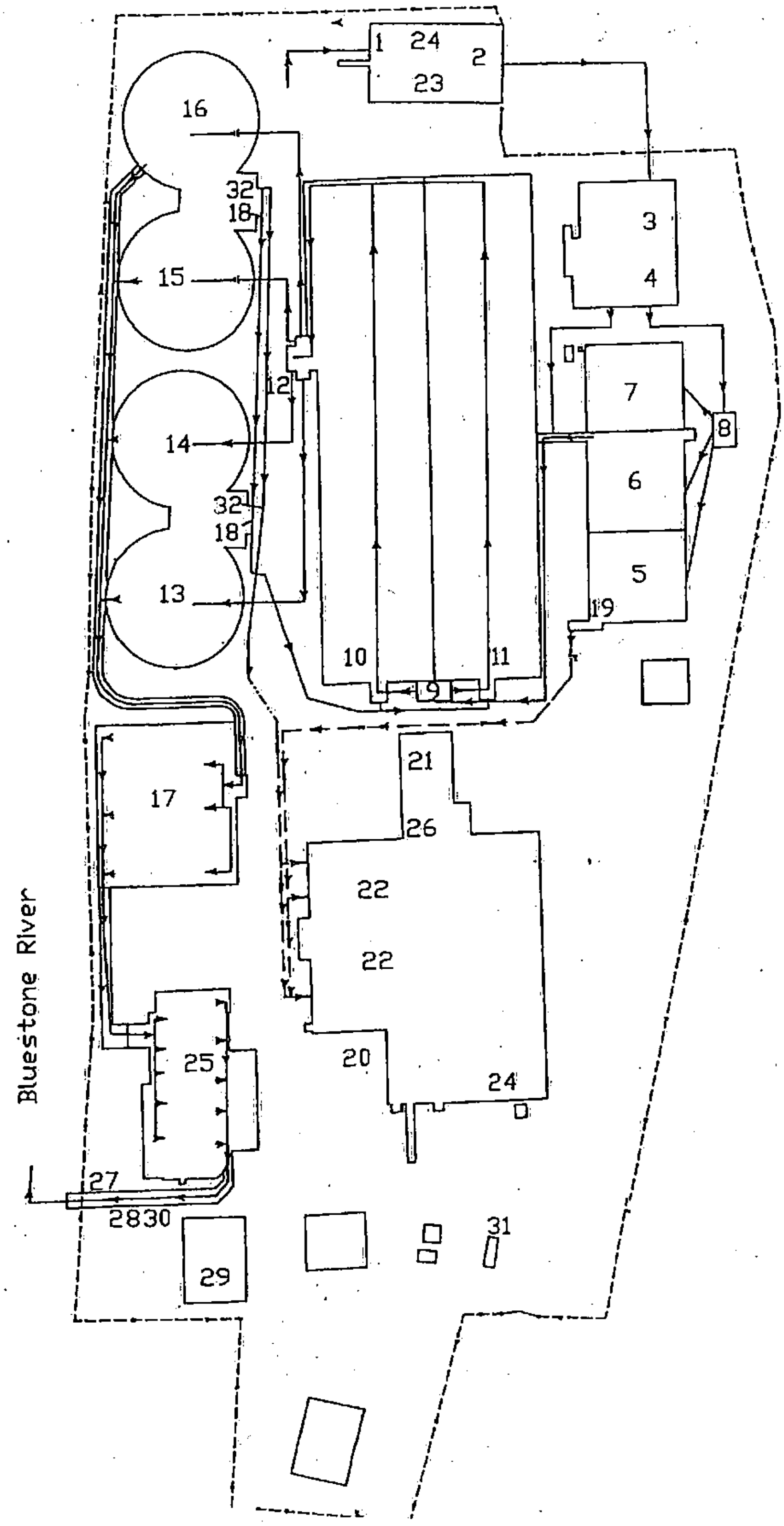
Area Engineer (Southwest)
Department of Environmental Quality
Office of Wastewater Engineering
Department of Environmental Quality

10/6/06
Date



Bluestone River
RIVER
outfall 001
Cascade
RAPID MIX TANK
DISINFECTION TANKS
No 5
SAND FILTER BUILDING
CONC. HEADWALL INV. EL. 2356.5
No 1
No 2
No 3
No 4
SECONDARY CLARIFIERS
42" D.I.P. 86.0' @ 0.07%
MH 42
MH 43
42" D.I.P. 140.0' @ 0.07%
MH 44
STORM INLET INV. EL. 2358.50
STORM INLET INV. EL. 2360.50
STORM INLET INV. EL. 2357.50
SLUDGE THICKENER
SLUDGE STABILIZATION TANKS
OPERATIONS BUILDING
6" ROOF DRAINS
5.3 MGD COMPLETE MIX ACTIVATED SLUDGE REACTORS
HEAD-WORKS BUILDING
STORM INLET INV. EL. 2363.0
12" PERF. C.M.P.
PARKING
PRIMARY CLARIFIERS
No. 1
No. 2
No. 3
Preliminary Treatment Building
PRIMARY RAPID MIX TANK
FIN. GRD. EL. 2363.50'
2" YARD HYDRANT (TYP.)
THE SANITARY BOARD OF BLUEFIELD
FEBRUARY, 1992
THOMPSON & LITTON, INC.
ENGINEERS ■ ARCHITECTS ■ PLANNERS
WISE, VIRGINIA

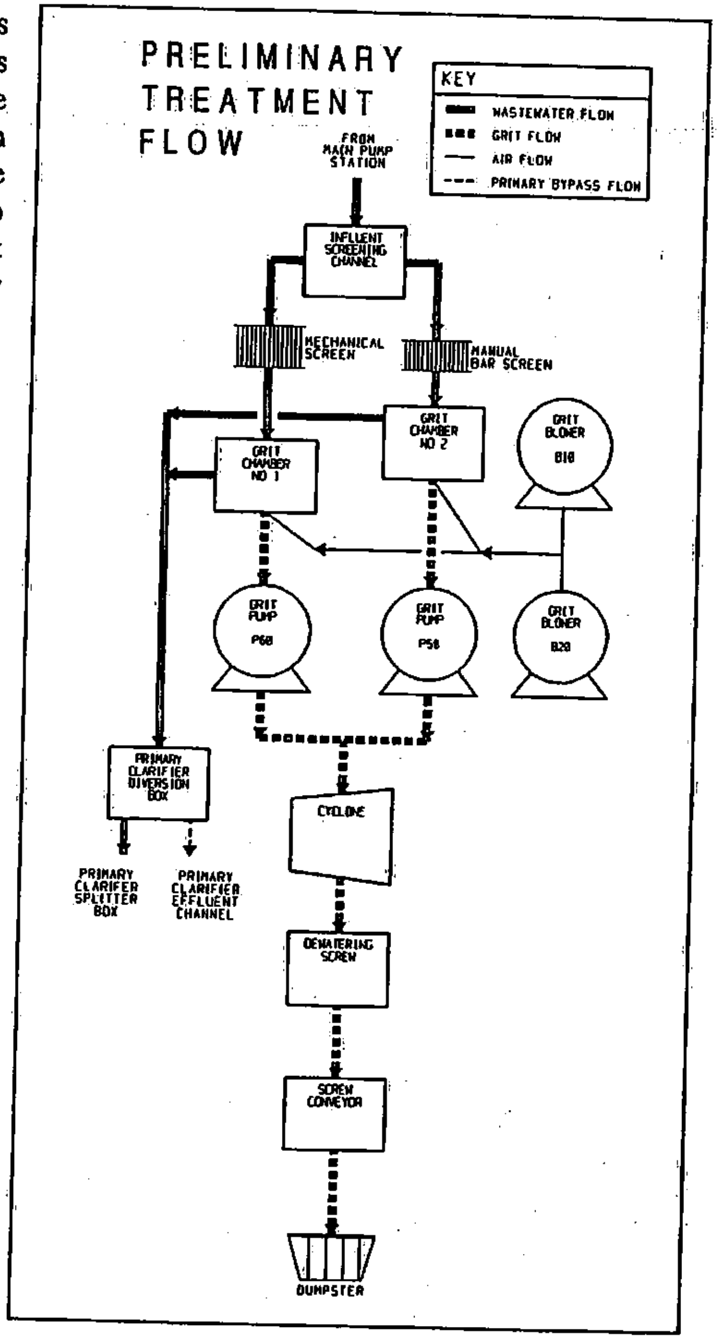
BLUEFIELD SANITARY BOARD
WESTSIDE TREATMENT PLANT



1. Roughing Screen
2. Main Pump Station
3. Fine Screen
4. Grit Removal
5. Primary Clarifier #1
6. Primary Clarifier #2
7. Primary Clarifier #3
8. Primary Clarifier Splitter Box
9. Aeration Tank Splitter Box
10. Aeration Tanks (Train 1)
11. Aeration Tanks (Train 2)
12. Secondary Splitter Box
13. Secondary Clarifier #1
14. Secondary Clarifier #2
15. Secondary Clarifier #3
16. Secondary Clarifier #4
17. Tertiary Filter #1, #2, #3
18. Return Sludge Pumps
19. Primary Sludge Pumps
20. Gravity Thickener
21. Purifax Units
22. Coil Filters
23. Blowers
24. Emergency Generators
25. Chlorine Contact Tanks
26. Chlorine Room
27. Post Aeration
28. DeChlorination
29. Sulphur Dioxide Bldg.
30. Effluent Parshall Flume
31. Septage Receiving Station
32. Secondary Waste Pumps

PROCESS

The preliminary treatment process uses screening and grit removal to remove debris from the influent raw sewage. One coarse mechanical screen in the main pump station and one fine mechanical screen in the preliminary treatment building are used to capture debris (primarily rags). All grit removal takes place in the preliminary treatment building.



Coarse Screening

In → Raw sewage flows by gravity from the Bluestone flow equalization and industrial retention facility to the influent screening channel in the main pump station.

Process A coarse mechanical screen, located in the screening channel, captures coarse debris which is discharged to a small dumpster.

→ Out The collected *debris* are hauled to the landfill. The *screened raw sewage* flows by gravity to the main pump station wet well.

Fine Screening

In → *Raw sewage* is pumped from the main pump station wet well to the influent screening channel in the preliminary treatment building.

Process A fine mechanical screen, located in the screening channel, captures fine debris which is discharged to a conveyor. The conveyor carries the debris to a dumpster.

→ Out The collected *debris* is hauled to the landfill. The *screened raw sewage* flows by gravity to the grit removal process.

Grit Removal

In – *Screened raw sewage* from the preliminary treatment building screening channel enters the aerated grit chamber.

Process In the chamber, dense debris (primarily grit) settles by gravity while aeration suspends organic matter and other light debris so that it will overflow the grit chamber to the primary treatment system. Periodically, the settled grit is removed, dewatered, and conveyed to a dumpster by grit handling equipment.

– *Out* The collected *grit* is hauled to the landfill. The *screened and degritted wastewater* flows by gravity to the primary treatment system.

CONTROL

The preliminary treatment system includes two mechanically-cleaned screens, two manually-cleaned bar racks, two grit chambers, and a grit handling equipment train. The operator regulates these units to control specific aspects of the treatment process.

Mechanically-Cleaned Screens

There are two mechanically-cleaned screens.

- The coarse mechanical screen is in the influent pump station. It is made of a conveyor belt with two sets of parallel bars partially submerged in the screening channel. The sets of bars are placed one over the other. The inner set removes solids larger than 15 mm; the outer set removes solids larger than 34 mm. The debris is deposited into a dumpster.
- The fine mechanical screen is in the preliminary treatment building. It is also made of a conveyor belt with two sets of parallel bars partially submerged in the screening channel with the sets of bars placed one over the other. The inner set removes solids larger than 6 mm; the outer set removes solids larger than 14 mm. The debris is deposited on a conveyor which is shared by the grit handling equipment. The collected debris is conveyed to a container located on the floor below. The conveyor is linked to run when the mechanical screen is running.

Both mechanical screens are operated by a 24 hour adjustable timer. Both screens automatically start when a float in their respective influent channels is raised. Both screens automatically start when the ambient temperature is below 40° F.

The operator regulates one timer for each mechanical screen to control screen run frequency and duration.

Run Cycle Frequency

The frequency of screen run cycle should be continuous or often enough to prevent the screen from clogging and blocking flow.

Operator action: Check screen daily. Adjust timer as needed to maintain sufficient flow through the screen.

The anticipated frequency is once per hour. However, experience will dictate the frequency needed to keep the screen clean.

- Frequency too low → clogged screen → influent raw sewage backup → raw sewage overflow → permit violation.
- Frequency too high → unnecessary expense.

Run Cycle Duration

The duration of screen run cycle should be long enough to remove all debris collected on the screen.

Operator action: Set timer to control how long the screen runs.

The anticipated run time is about 10 minutes. However, experience will dictate the duration needed to keep the screen clean.

- Run time too short → clogged screen → influent raw sewage backup → raw sewage overflow → permit violation.
- Run time too long → unnecessary expense.

Manually-Cleaned Bar Rack

The manually-cleaned bar rack, a back-up unit used when the mechanical screen is out of service, is a stationary comb of parallel bars (3/4" apart) partially submerged in the bypass channel.

The operator cleans the bar rack as needed.

Cleaning Frequency

The frequency of rack cleaning should be often enough to prevent the rack from clogging and blocking flow.

Operator action: When bar rack is in use, monitor several times per day. Rake captured debris into container as often as needed to prevent build-up on bars. After each cleaning add lime to the container to reduce odor and control vector problems. When the container is full, haul the debris to the landfill.

Aerated Grit Chambers

The aerated grit chambers are rectangular tanks with slopped bottoms that direct settled grit into a hopper in the center bottom of each tank. Air diffusers are placed on the bottom and along one long side of each chamber. The upward movement of air through the wastewater on one side of the tank causes the tank contents to move perpendicular to the influent flow at a rate of approximately 1 fps. This movement is called roll velocity.

The operator regulates air flow to control wastewater velocity.

Velocity

The velocity of the wastewater in the grit chamber effects grit settling. If velocity is too high, grit cannot settle; if too low, organic matter settles with the grit.

Operator action: Monitor grit settling. If some of the grit does not settle but leaves with the effluent, or, if an excessive amount of organic matter settles with the grit, then adjust air flow.

The design velocity is 1 foot per second.

- Velocity too high → grit in suspension → grit in preliminary effluent → increased equipment wear and build-up of grit in downstream process units → unnecessary expense.
- Velocity too low → other debris settles with the grit → increased volume of debris conveyed to dumpsters → extra trips to landfill → unnecessary expense.

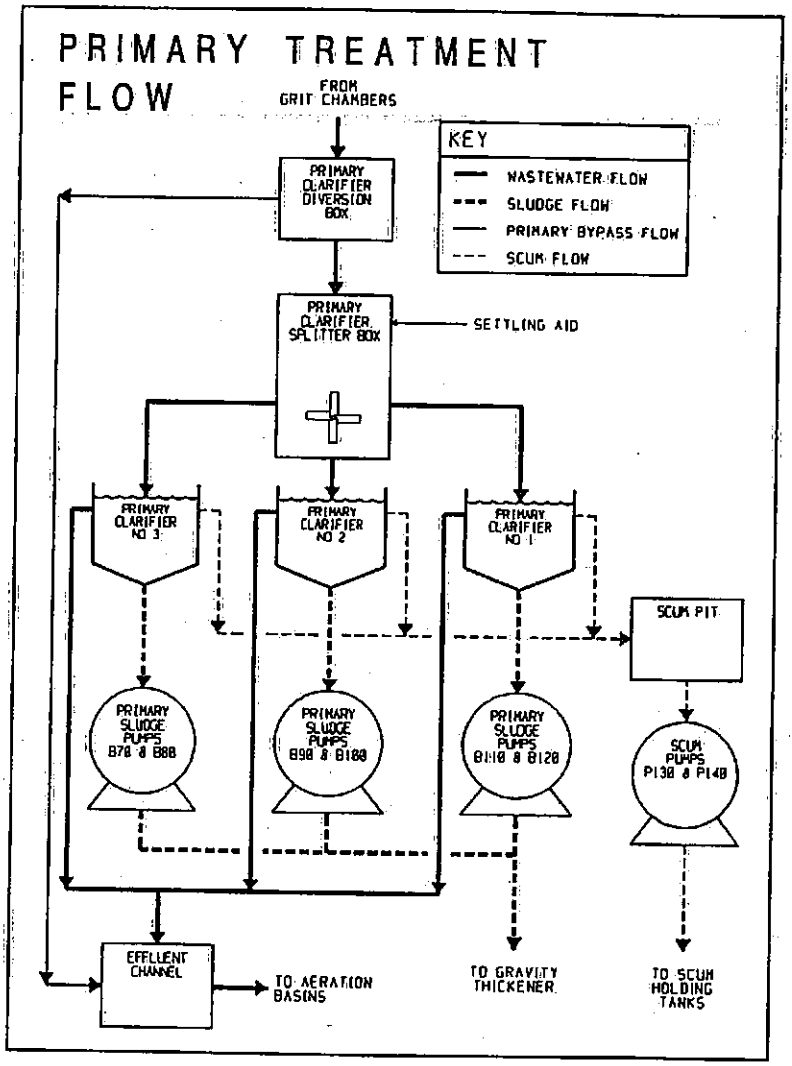
Grit Handling Equipment Train

The grit handling equipment train includes a grit pump, a grit cyclone, and a dewatering screw. This equipment automatically conveys the grit from the bottom of the grit chambers and prepares it for disposal. First, the dewatering screw starts. Then the grit pump starts and pumps the grit slurry through the grit cyclone. Then, the cyclone, powered by the water's force, centrifugally separates the wastewater from the grit. Finally, the dewatering screw receives the grit and dewaters it as is carries it from the cyclone to a conveyor. The conveyor discharges the grit to a dumpster.

The operator sets the timers to control grit removal frequency and duration .

PROCESS

The primary treatment process uses gravity to separate suspended solids from the screened and degritted wastewater.



In → Pollutant-laden *preliminary effluent* flows by gravity from the preliminary treatment building to the primary clarifier splitter box. The primary clarifier splitter box proportions the combined flow to each primary clarifier in service.

Process In each clarifier, a baffle breaks the force of the influent flow and distributes it evenly over the liquid surface to prevent turbulence. In these quiescent conditions, particles settle to the bottom of the clarifier as primary sludge and floatable solids rise to the surface as scum, allowing the water to clarify. The primary clarifiers reduce BOD_5 (30% removed), and TSS (50% removed) content of the preliminary effluent.

→ *Out* The floating solids, called *primary scum*, are collected in a scum pit and pumped to the scum holding tank (adjacent to the operations building) where they are thickened and stored prior to being stabilized. The settled *primary sludge* is pumped from the clarifiers to the gravity thickener where they are thickened prior to being stabilized. The *clarified wastewater*, displaced by influent flow, overflows the weirs of the clarifiers to the secondary treatment process.

CONTROL

The primary treatment system includes a primary clarifier diversion box, a primary clarifier splitter box, and the primary clarifiers. The operator regulates these units to control specific aspects of the treatment process.

Primary Clarifier Diversion Box

A primary clarifier diversion box, located in the preliminary treatment building, receive flow from the grit chambers and discharges to either the primary clarifier splitter box or the primary clarifier effluent channel or both. Flow could be diverted to bypass the primary clarifiers and sent directly to the aeration basins when influent BOD loading on the secondary treatment system is not adequate for maintaining adequate levels of biological treatment in the secondary treatment process.

Primary Clarifier Splitter Box

The primary clarifier splitter box serves two purposes:

- The primary clarifier splitter box is a splitter that receive flow from the preliminary treatment building and evenly distributes flow to the 3 primary clarifiers.
- The primary clarifier splitter box is a mixing basin which can receive a settling aid from a chemical feed system in the operations building. A settling aid could be added to the primary clarifier splitter box when primary effluent BOD loading on the secondary treatment system is too high.

Clarifiers

The three clarifiers are rectangular tanks which receive flow from the primary clarifier splitter box and distribute flow to the aeration basins.

Each clarifier is equipped with an influent well which receives clarifier influent and breaks the force of the influent wastewater.

Each clarifier is equipped with sludge removing equipment which includes sludge scrapers and a sludge hopper. Sludge scrapers, set to the slope of the tank bottom, continuously revolve around the central column and scrape sludge into the hopper in the bottom center of the tank. From each hopper, sludge is continuously pulled by 2 variable speed plunger pumps (maximum flow rate of 200 gpm) and discharged to the gravity thickener in the operations building.

Each clarifier is equipped with scum removing equipment which includes a baffle and a skimmer. The circular baffle prevents scum from leaving with the clarified wastewater. The skimmer continuously revolves around the central column and moves the scum into a scum trough. The scum flows from the trough into a scum pit. Two constant speed progressing cavity pumps (rated at 50 gpm) pump the scum from the scum pit to the scum holding tank adjacent to the operations building.

The operator regulates the scum pumps to control primary scum removal.
The operator regulates sludge pumps to control primary sludge removal.

Scum

Scum is produced in varying amounts according to upstream conditions. An increase in scum may indicate such problems as inadequate removal of grease in preliminary treatment process or unusually high amounts of grease in the plant influent.

Operator action: Monitor scum pit daily for proper operation of scum pumps. Pump scum operation as needed.

Sludge

Primary sludge is the sludge that is removed from the bottom of the primary clarifiers and pumped to the sludge thickener. The primary sludge flow rate is controlled by variable speed pumps and timers. If the flow rate is too low, sludge blanket depth increases and clarifier efficiency decreases.

Operator action: Monitor sludge blanket depth. When depth increases adjust pump flow rate and cycle timers to maintain a sludge blanket depth under 3 feet.

The anticipated maximum sludge flow rate is 0.03 MGD. However, experience will dictate the flow rate needed to maintain sludge blanket depth as low as possible.

- Flow rate too low → increase in sludge blanket depth → high solids concentration in clarifier effluent → increase BOD of aeration basin influent → increased aeration in secondary treatment system → unnecessary expense
- Flow rate too high → turbulence in gravity thickeners → poor settling in thickener → high solids concentration in thickener effluent → increased BOD of aeration basin influent → increased aeration in secondary treatment system → unnecessary expense

EVALUATION

The operator evaluates process performance to determine the effectiveness of the current control strategy and to forecast the need for a new one. Process performance evaluations involve careful reviews of current and past process records, such as lab results, calculations, visual observations and chosen control strategies.

- Table 1 lists the tests performed to aid in the evaluation of the primary treatment process. Comparing the test results of the process influent and effluent reveals the effectiveness of the treatment process. Table 1 also lists the design ranges for the test results. A test result outside of its given range may indicate the need for a new control strategy.

PROCESS

The secondary treatment process uses biological treatment and clarification to remove pollutants from the primary effluent. First, the biological treatment process stimulates naturally occurring microorganisms to consume ammonia and organic carbon compounds. Then, the clarification process removes the microorganisms from the wastewater.

Biological Treatment

In – Pollutant-laden *primary effluent* flows from the primary clarifiers to the aeration basin splitter. The splitter proportions the combined flow to the two aeration basins. Each aeration basin also receive flow from *return activated sludge* (RAS) which contains pollutant-consuming microorganisms and *mixed liquor recycle* which contains nitrates.

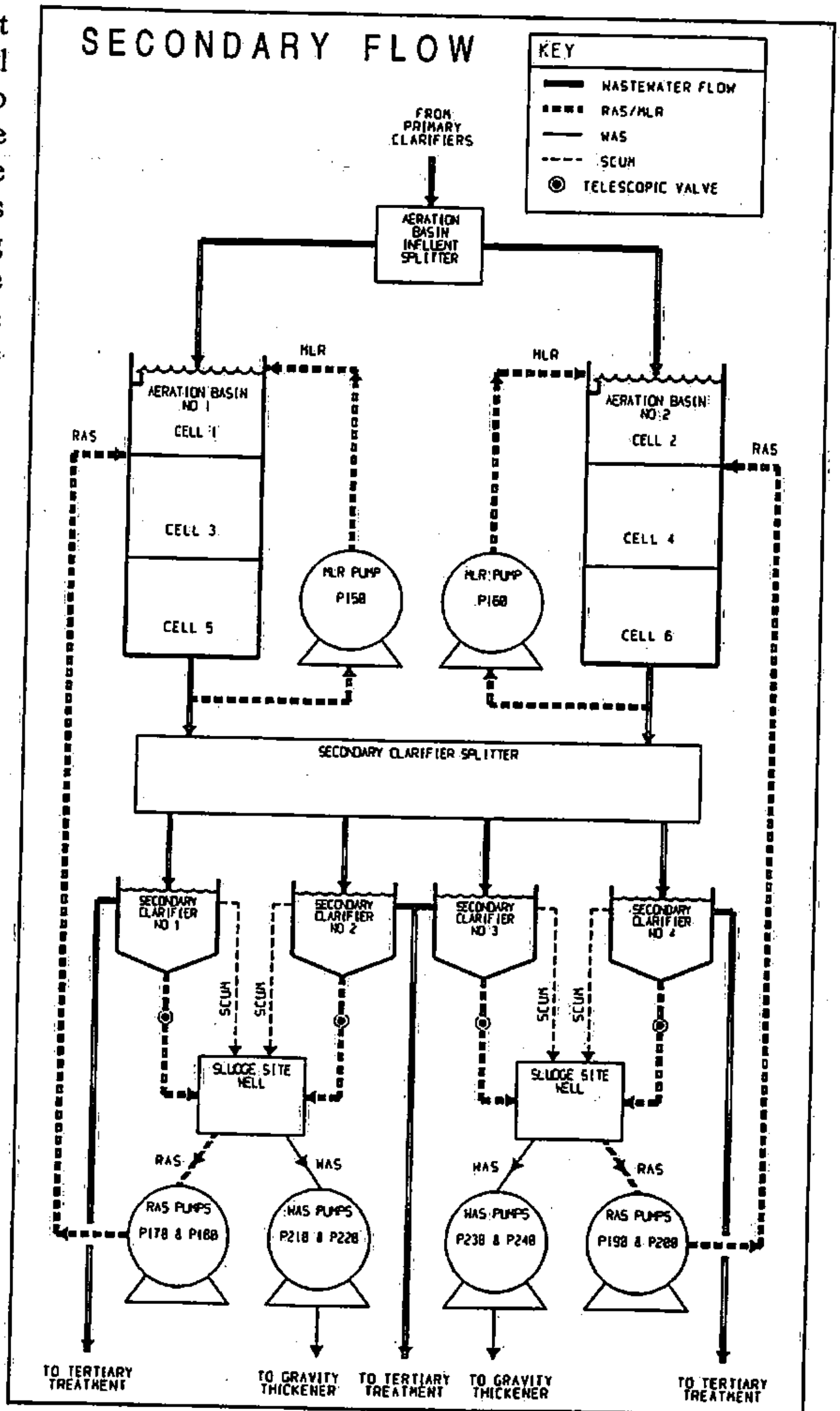


Figure 1

Process In each aeration basin, the wastewater is mixed to keep the microorganisms in suspension and in contact with the pollutants. This mixture of organisms and nutrients, called activated sludge mixed liquor, passes through a series of three cells each allowing time for the microorganisms to join together in colonies (called floc particles) and consume pollutants (see figure 2 and figure 3).

Each of the three cells provide a different level of biological treatment.

- The first pair of cells (cells 1 & 2), called the anoxic zone, provide mixing and no oxygen to encourage microorganisms to consume carbonaceous waste using recycled energy obtained when they strip oxygen from nitrate molecules.
- The second pair of cells (cells 3 & 4), called an oxic zone, provides free oxygen by releasing many small bubbles from diffusers in the bottom of the basins. In this cell the microorganisms get energy from the free oxygen and continue to consume carbonaceous waste.
- The third pair of cells (cells 5 & 6), also called an oxic zone, also supplies free oxygen with bubble diffusers. But by the time the wastewater has reached these cells there is little carbonaceous material left in the wastewater. This prevents the more aggressive carbonaceous eating organisms from growing and allows a less aggressive organism to grow, consume ammonia, and release nitrates. A pump carries a portion of the nitrate rich mixed liquor from the end of the aeration basins back to cells 1 & 2 (see figure 2 and figure 3).

- Out The mixed liquor, displaced by influent flow, overflows the aeration basins to the clarification process.

Clarification

In - *Aeration basin effluent*, or mixed liquor, a mixture of floc particles and biologically treated wastewater, is proportionally distributed to the four secondary clarifiers.

Process In each clarifier, a baffle breaks the force of the influent flow and distributes it evenly over the liquid surface to prevent turbulence. In these quiescent conditions, floc particles settle to the bottom of the clarifier as activated sludge and floatable solids rise to the surface as scum, allowing the water to clarify.

- Out The *scum* is collected and discharged to the sludge site well between each pair of clarifiers. The settled *activated sludge* drains into the sludge site well also. Most of the sludge site well contents are pumped from the clarifiers to the aeration basins as return activated sludge (RAS) to consume more pollutants. Periodically, a controlled portion is pumped to the gravity thickener adjacent to the operations building as waste activated sludge (WAS) to prevent solids build-up in the secondary treatment system. The *clarified wastewater*, displaced by influent flow, overflows the weirs to the tertiary treatment process.

WASTEWATER BIOLOGY BASICS[1]

Many different microorganisms play important roles in the treatment of wastewater.

Heterotrophic bacteria, the dominant microorganism, are the main consumer of organic carbon compounds which they convert to settleable cell tissue.

Autotrophic bacteria are the main consumers of ammonia. Two varieties, Nitrosomonas and Nitrobacter, work together to convert ammonia to nitrates.

Protozoa are the main producers of the flocculent which joins the bacteria together to form colonies. Also, by consuming bacteria, protozoa help stabilize the bacterial population and keep it healthy. Additionally, the type and quantity of the protozoan population, as revealed by microscopic examination, are indicators of the health of the treatment process.

Filamentous organisms, both bacterial and fungal, form webs or "backbones" upon which bacterial colonies adhere to form durable, settleable floc particles.

Fungi and saprophytic bacteria help keep the floc particles clean and healthy by consuming dead organisms.

Nematodes and rotifers bore into floc particles allowing passage of oxygen and food to the microorganisms. Also, by consuming bacteria, nematodes and rotifers help stabilize the bacterial population and keep it healthy.

Together these microorganisms create floc particles.

Floc particles develop in stages. First, bacteria "agglutinate" or attach to each other, forming small bacterial colonies. Then, a sticky substance or flocculent produced primarily by the protozoa, joins the small bacterial colonies together into larger colonies and attracts free swimming non-agglutinating bacteria to the colonies. At this point the colonies are extremely fragile. Finally, filamentous organisms, both bacterial and fungal, form islands of woven filaments or "backbones" upon which the colonies adhere. Now the floc particles are durable enough to survive mixing and pumping and dense enough to settle in a quiescent environment.

The microorganisms require oxygen to survive. Oxygen is present in aerobic and anoxic conditions.

Aerobic conditions occur when free oxygen (dissolved oxygen or DO) is available for the microorganisms to consume. The oxygen is supplied by aerators. Anoxic conditions occur when free oxygen is absent but bound oxygen is available in nitrate (NO_3) molecules. Nitrates are formed in aerobic conditions by autotrophic bacteria. Anaerobic (or septic) conditions occur when microorganisms have consumed all free and bound oxygen.

In aerobic conditions:

Heterotrophic bacteria:

- **consume dissolved oxygen** (measured as DO).
- **consume organic carbon compounds** (measured as $CBOD_5$).
- **grow rapidly**, and thus require less time (measured as MCRT) to treat the wastewater than the slower growing Nitrosomonas bacteria.

1 - For more in-depth information, see WEF publications "Wastewater Biology: The Life Processes" and "Wastewater Biology: The Microlife".)

Figure 2

Two varieties of autotrophic bacteria, Nitrosomonas and Nitrobacter, work simultaneously to convert ammonia (NH_3) to nitrates (NO_3). This process is called nitrification.[2]

Nitrosomonas:

- **consume dissolved oxygen** (measured as DO). Together, the nitrifying bacteria consume 2.5 times more oxygen than the heterotrophic bacteria.
- **consume ammonia** (NH_3).
- **consume inorganic carbon compounds** (measured as alkalinity) which are contained in the process influent[1] and the MLR.
- **release nitrites** (NO_2) in the process of consuming oxygen (O_2) and ammonia (NH_3). This is the first step in the nitrification process.
- **grow slowly** and thus produce limited amounts of nitrites. This in turn limits the growth of the faster growing Nitrobacter bacteria that depend on nitrites to thrive. In addition, the Nitrosomonas bacteria require more time (measured as MCRT) to treat the wastewater than the faster growing heterotrophic and Nitrobacter bacteria.

Nitrobacter:

- **consume dissolved oxygen** (measured as DO). Together, the nitrifying bacteria consume 2.5 times more oxygen than the heterotrophic bacteria.
- **consume nitrites** (NO_2) that are released by the Nitrosomonas bacteria.
- **consume inorganic carbon compounds** (measured as alkalinity) which are contained in the process influent and the MLR.
- **release nitrates** (NO_3) in the process of consuming oxygen (O_2) and nitrites (NO_2). This is the second step in the nitrification process.
- **grow rapidly** and thus consume all of the nitrites (NO_2) produced by the Nitrosomonas bacteria.

In anoxic conditions:

Heterotrophic bacteria:

- **consume nitrates** (NO_3) that were released by the nitrifying bacteria in aerobic conditions. The nitrates are consumed for oxygen.
- **release inorganic carbon compounds** (measured as alkalinity) in the process of consuming nitrates (NO_3) and organic carbon compounds (measured as $CBOD_5$). The inorganic carbon compounds then pass to the following basins where they will be consumed by the autotrophic bacteria.
- **release inorganic carbon compounds** (measured as alkalinity) which are contained in the process influent.
- **consume organic carbon compounds** (measured as $CBOD_5$).
- **release nitrogen gas** (N_2) as a byproduct of metabolizing nitrates for oxygen. The nitrogen gas escapes from the system and into the atmosphere. This process is called denitrification.

Autotrophic bacteria are inactive.

1- The plant influent contains a minimum of 50 mg/l of alkalinity a all times which is adequate for biological nitrification to occur.
2 - The nitrifying organisms actually consume the ammonium ion (NH_4^+) which is in equilibrium with ammonia (NH_3^{++}) at a pH of 6.5 to 7.5. For the sake of simplicity, ammonia will replace ammonium ion throughout the text.

Figure 2 (continued)

CARBON OXIDATION/NITRIFICATION PROCESS SCHEMATIC

WITH MLR & WITHOUT D.O. IN ANOXIC ZONE

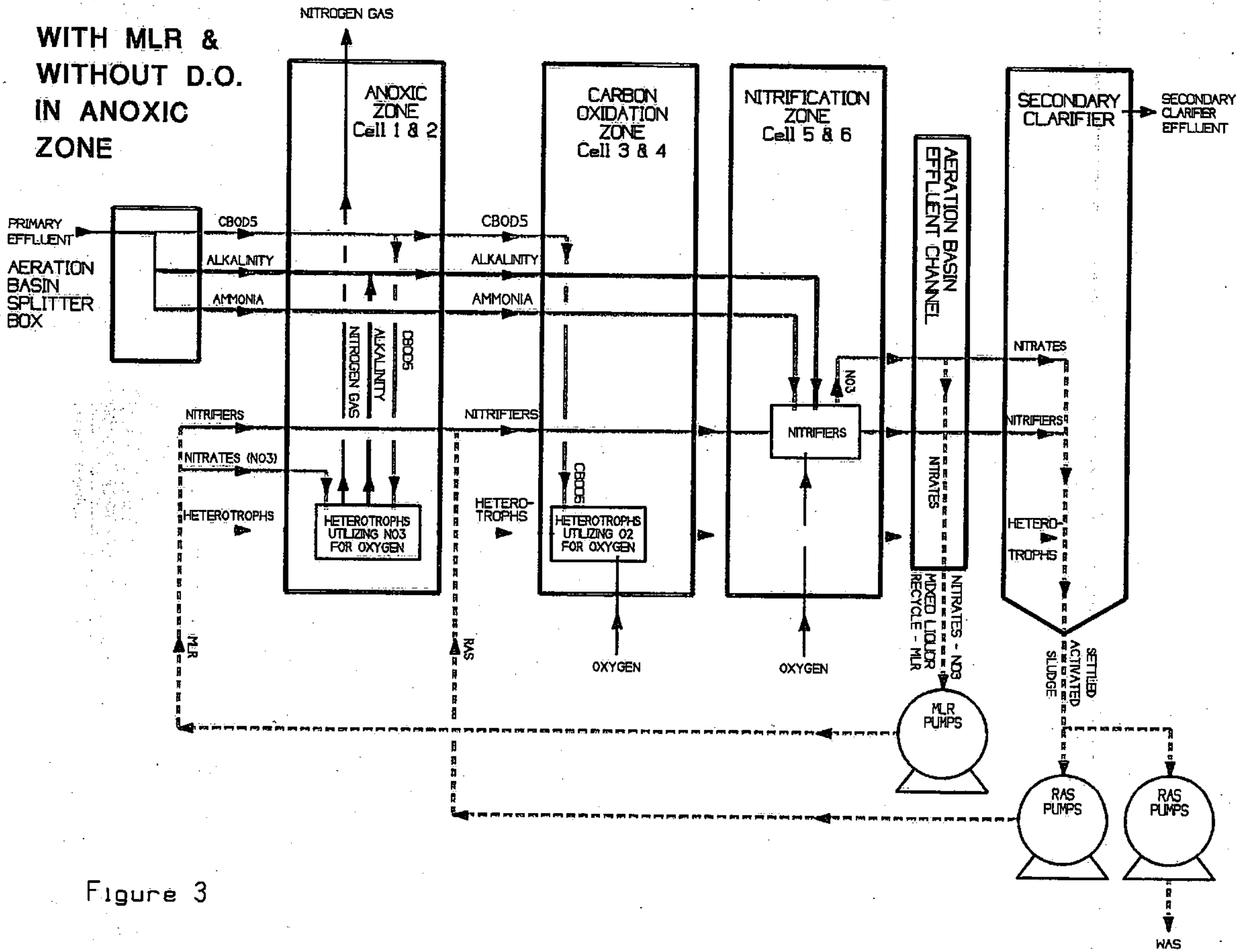


Figure 3

CONTROL

The secondary treatment system includes the aeration basins, clarifiers, and pump stations. The operator regulates these units to control specific aspects of the treatment process.

Aeration Basins

The two parallel aeration basins are rectangular tanks which receive flow from the primary treatment system. Each basin is divided into 3 cells labeled 1 through 6 (see figure 1). Cells 1 and 2 are equipped with 2 mixers per cell. All 6 cells are equipped with an array of rectangular diffusers. A mixed liquor recycle (MLR) system includes two pumps, one pinch valve, one flow meter, and 4 slide gates to control recycle of the mixed liquor from the effluent end of the basins either to cells 1 & 2 or 3 & 4.

The mixers mix the incoming wastewater with the recycled nitrates without adding any free oxygen in cells 1 & 2.

The diffused air mixes and aerates the wastewater in cells 3 - 6. Aeration occurs as tiny bubbles pass upward through the wastewater, thereby adding dissolved oxygen (DO). The more air forced through the diffusers the more bubbles formed, the greater the aeration. The upward motion of bubbles floating to the surface creates a mixing action in the basins.

The mixed liquor recycle pumps pump nitrate rich mixed liquor from bottom of the effluent end of the aeration basins back to either cells 1 & 2. A Parshall flume is placed in the mixed liquor recycle channel to measure the flow. A pinch valve on the pump discharge is used to control the recycle flow rate.

The operator regulates the mixers, diffused air and recycle flow to provide aerobic conditions in cells 3 through 6 and anoxic conditions in cells 1 and 2.

Aerobic conditions

Aerobic conditions provide the DO necessary for bacteria to treat wastewater. If DO is low (in cells 3 -6), autotrophic bacteria are the first to slow down (particularly in cells 5 & 6) and thus nitrification (the conversion of ammonia to nitrates) is reduced. If DO is high, filamentous organisms grow in excess and create too much webbing in the floc particles, thereby reducing floc density and settleability.

Operator action: Monitor DO in cells 3-6 daily. When DO approaches a limit, adjust diffuser blower speed to control the volume of air entering the aeration basins.

The design DO is 1.0-2.0 mg/l. However, experience will dictate the best range for optimum biological treatment.

- DO too low → reduced autotrophic bacteria activity → inadequate nitrification → high NH_3-N in plant effluent → permit violation.

- DO too high → excess growth of filamentous organisms → poor settling in clarifiers → high TSS in plant effluent → permit violation.
- DO too high → unnecessary expense.

Anoxic Conditions

Anoxic conditions are provided by the absence of free oxygen and the presence of nitrates.

Under anoxic conditions the heterotrophic bacteria absorb nitrates (NO_3) for the oxygen they need to consume CBOD. The left over nitrogen molecule is released to the atmosphere as nitrogen gas (N_2). This biological process, called denitrification, allows CBOD removal using recycled oxygen. The nitrate molecule is recycled from the end of the aeration basins where autotrophic bacteria have just finished releasing it in the process of breaking down ammonia (see figure 2 and figure 3). This recycling of oxygen reduces cost by reducing the amount of aeration needed for CBOD removal.

Under anoxic conditions the absence of free oxygen inhibits the excessive growth of Nocardia bacteria. Nocardia bacteria are a filamentous bacteria which, in small amounts, can benefit the biological treatment process by consuming organic carbon compounds too complex for other microorganisms. However, in large amounts, Nocardia generate a quantity of greasy foam that is difficult to remove. Because Nocardia require dissolved oxygen to survive, their growth can be controlled by providing anoxic conditions in cells 1 & 2. Without dissolved oxygen, Nocardia die while competing beneficial microorganisms survive.

Although nitrate removal is not required on the NPDES permit, it is justified by 1) a reduction in treatment costs, that results from the recovery of the oxygen from the nitrates for CBOD removal and 2) by the control of Nocardia bacteria, that results from a low oxygen environment.

Operator action: Adjust the mixed liquor recycle flow rate by adjusting the pinch valve to provide an adequate supply of nitrates to the anoxic zone.

The design flow rate is 100% of the plant influent flow rate. However, experience will dictate the optimum flow rate for complete denitrification.

- Recycle flow rate too low → inadequate nitrates in cells 1 & 2 → loss of nitrate bound oxygen with effluent → reduced CBOD removal in cells 1 & 2 → increase aeration to remove additional CBOD in cells 1 & 2 → increased costs.
- Recycle flow rate too low → inadequate nitrates in cell 1 & 2 → no available oxygen for heterotrophic bacteria → anaerobic conditions → increased BOD loading on subsequent cells → reduced nitrification → permit violation.
- Recycle flow rate too high → excessive pumping → increased costs.

Clarifiers

The four clarifiers are circular tanks which receive flow from the aeration basins. Each clarifier is equipped with sludge and scum collection and removal equipment.

Sludge and scum collecting equipment - The four secondary clarifiers are each circular tanks equipped with sludge and scum collecting equipment.

Sludge collecting equipment includes sludge scrapers and a single tube header. Sludge scrapers, set to the slope of the tank bottom, continuously revolve around the central column and scrape sludge so that the header can pull sludge from the clarifier floor. The header and scrapers extend across the full radius of the clarifier. One header for each clarifier includes orifices spaced and sized to withdraw sludge evenly along the length of the header.

Scum collecting equipment includes scum baffles, scum skimmers, and a scum trough. The scum skimmer rotates over the water surface on the same axis as the sludge header. Scum baffles on the inside of the effluent weirs prevent scum from leaving with the clarified wastewater. The scum skimmer pushes scum into a scum trough that drains into a site well between the clarifiers.

Sludge and scum removal equipment - Each of two secondary clarifier buildings placed between each pair of clarifiers houses the following sludge and scum removal equipment:

- 2 RAS pumps to return sludge from the clarifier sludge headers to cells 3 and 4 in the aeration basins;
- 1 telescopic valve per clarifier to control the flow of sludge from the bottom of the clarifier to the sludge site well;
- 2 WAS pumps to pump sludge from the site well to the gravity thickener; and
- 1 wet well that accepts sludge from the single tube header and scum from the clarifier scum troughs.

The operator has no control over the removal of scum.
The operator regulates

- *the telescopic valves to control return activated sludge (RAS);*
- *the WAS pumps to control the waste activated sludge (WAS);*

Scum

Scum is produced in varying amounts according to upstream conditions. An increase in scum may indicate such problems as excessive grease in the plant influent.

Operator action: Establish and enforce pretreatment standards on industrial and commercial grease dischargers.

RAS

RAS is the activated sludge that is returned to cells 3 & 4 in the aeration basins. The RAS flow rate from each clarifier is controlled to maintain the sludge blanket depth in each clarifier as low as possible. If the flow rate is too low, sludge blanket depth increases and clarifier efficiency decreases.

Operator action: Monitor sludge blanket depth daily. When depth increases, increase RAS pump flow rate then adjust telescopic valves to match.

Caution: To avoid hydraulic shocking of clarifiers, adjust RAS flow rate gradually (not more than a 20% adjustment per day).

The design RAS sludge flow rate (total from all clarifiers) is 50% of the plant influent flow rate. However, experience will dictate the flow rate needed to maintain sludge blanket depth as low as possible.

- Flow rate too low → increase in sludge blanket depth → high TSS in plant effluent → permit violation.
- Flow rate too low → decreased MLSS → poor biological treatment → permit violation.
- Flow rate too high → turbulence in clarifiers → poor settling in clarifiers → high TSS in plant effluent → permit violation.
- Flow rate too high → unnecessary expense.

WAS

WAS is the activated sludge removed from the secondary treatment system to control solids inventory (see figure 4). An ideal solids inventory maintains just enough activated sludge in the secondary treatment system to treat the wastewater. Any excess sludge is removed as WAS.

Operator action: Remove WAS 3-7 days per week, or as often as needed to maintain an active biomass that has good settleability in the secondary clarifiers and effectively removes BOD_5, TSS, and NH^3 from the wastewater. There are many viable methods for evaluating the amount of WAS to remove from an activated sludge system. The method presented in this manual is called MCRT (see figure 4). The chosen method for solids inventory control is entirely at the discretion of the plant superintendent.

The actual MCRT (see figure 5) of the mixed liquor is measured against a selected target MCRT. The actual MCRT should be maintained within 20% of the target MCRT by following these steps:

1. Establish a target MCRT seasonally, or as often as needed, according to:
   - Process performance evaluations. An overall evaluation of the treatment process alerts the operator to current or potential problems and may indicate the need for a target MCRT adjustment (see "Process Performance Evaluation").

SOLIDS INVENTORY & MCRT

Solids inventory is the amount of solids in the secondary treatment system, resulting from solids entering, retained, and removed from the system.

Solids <u>entering</u> are pollutants (measured as BOD_5 and TSS) in the preliminary effluent.
Solids <u>retained</u> (measured as MLSS) are primarily microorganisms that consume pollutants. They are retained by recycling clarifier sludge to the aeration basins. The recycled sludge is called return activated sludge (RAS).
Solids <u>removed</u> are also primarily microorganisms that consume pollutants. They are removed by wasting clarifier sludge to the gravity thickener. The removed sludge is called waste activated sludge (WAS).

MCRT stands for mean cell residence time or the average amount of <u>time</u> solids are retained in the system. MCRT is an indirect measure of solids inventory. This is because solids are always entering the system, so that as the MCRT increases, solids inventory increases.

Solids inventory/MCRT is controlled by adjusting the balance between the amount of solids entering and removed from the system. Since the amount of solids entering cannot be controlled, varying the amount of solids removed, by adjusting the volume of WAS, is the only way to control solids inventory/MCRT.

Figure 4

- Average wastewater temperature. Changes in temperature affect the activity of the microorganisms. As temperature drops and microorganism activity slows, an increase in the target MCRT is necessary.

- Average $CBOD_5$ and ammonia loadings. Changes in the amount of pollutants in the wastewater affects the amount of microorganisms needed to treat the water. As average loadings increase, so should the target MCRT.

2. Calculate the volume of WAS needed to regain target MCRT, then calculate elapsed time for WAS pump operation (see figure 6).The design MCRT is 20-30 days. Experience will dictate the optimum MCRT for adequate secondary treatment.

   Note: Warmer weather may call for a decrease in MCRT, colder weather an increase.

- Too much WAS → MCRT too short → solids inventory too low → inadequate number of microorganisms to consume incoming pollutants → inadequate biological treatment → permit violation.
- Too little WAS → MCRT too long → solids inventory too high → excess solids in system → high TSS in plant effluent → permit violation.

ACTUAL MCRT FORMULA

$$\text{Actual MCRT, days} = \frac{(F)(A)}{((B)(C)) + ((D)(E))}$$

A = Mixed liquor TSS (MLSS) from all aeration basins in service (results averaged), mg/l (Design concentration is a minimum of 2,500 mg/l)
B = Plant effluent flow, MGD
C = Plant effluent TSS, mg/l
D = Waste activated sludge TSS, mg/l
E = Waste activated sludge flow, MGD
F = Volume of all aeration basins and clarifiers in service, MG
Clarifier = 0.292 MG each
Aeration basin = 1.424 MG each

More accurate MCRT values are obtained by using running seven-day averages of collected data. In other words, for each day that the MCRT is being calculated, that day and the previous six days of input data is averaged.

Although the MCRT can be calculated more accurately using the MLVSS, the MLSS provides results with sufficient precision to allow good process control as long as the ratio of MLVSS to MLSS doesn't fluctuate significantly from day to day.

Figure 5

WAS FORMULAS

1) Calculate pounds of WAS needed.

$$A = \frac{(J)(F)(8.34\ \#/g)}{H} - (D)(E)(8.34\ \#/g)$$

2) Calculate volume of WAS needed.

$$B = \frac{(A)(1{,}000{,}000)}{(G)(8.34\ \#/g)}$$

3) Calculate WAS pump time needed.

$$I = \frac{B}{C}$$

A = WAS, pounds
B = WAS volume, gpd
C = WAS pump flow rate, 200 gpm
D = Plant effluent flow, mgd
E = Plant effluent TSS, mg/l
F = MLSS of all aeration basins in service (results averaged), mg/l (Design concentration is minimum 2,500 mg/l)
G = Waste activated sludge TSS, mg/l
H = Target MCRT, days
I = WAS pump elapsed time for wasting, min
J = Volume of all aeration basins and clarifiers in service, MG
Clarifier = 0.292 MG each
Aeration basin = 1.424 MG each

Figure 6

PROCESS

The gravity thickener uses gravity settling and air to allow sludge to thicken to 4-8 % solids in preparation for sludge stabilization and dewatering.

Gravity Thickener

In - Primary sludge, secondary sludge, and secondary scum are pumped from their respective pump stations to the gravity thickener influent well.

Process The gravity thickener is designed to provide a quiescent environment for the settling of primary and secondary sludge solids. The thickened sludge blanket that results is gently mixed to release bubbles formed from biological activity.

- Out The thickener supernatant flows over the gravity thickener weir, then travels by gravity to the drain. Filtrate from the vacuum dewatering system may be added to the discharging thickener supernatant. The settled solids, called thickened sludge, are pumped from the gravity thickeners to the Purifax units.

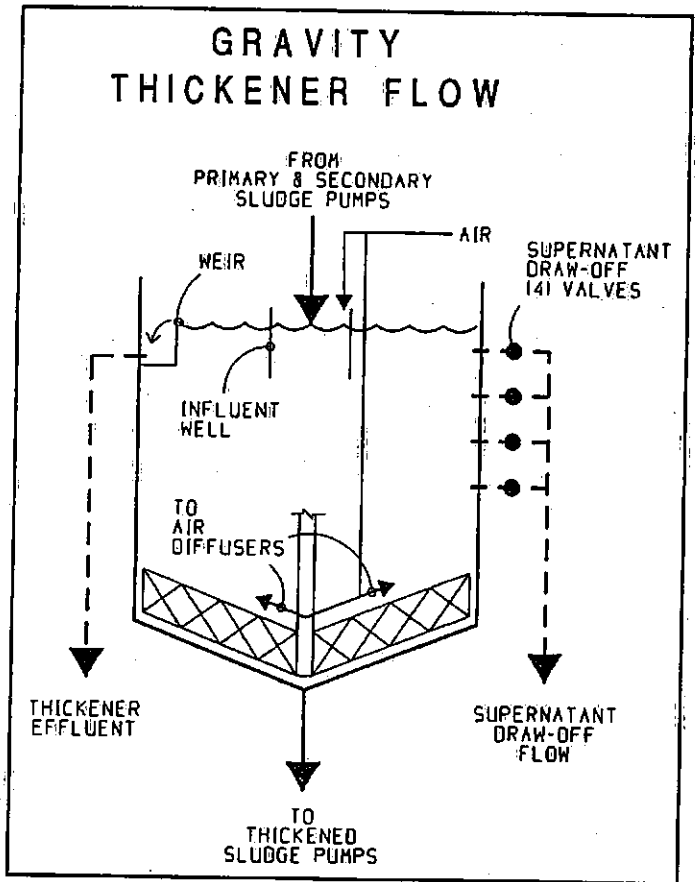


Figure 1

CONTROL

The gravity thickening system includes the thickener, two thickened sludge pumps, and an air supply. The operator regulates equipment associated with these units to control specific aspects of the treatment process.

Thickener

The gravity thickener is a rectangular tank which receives influent flow from the primary and secondary sludge pumps (which include secondary scum) and overflow supernatant to the plant drain. Thickened sludge is drawn from the bottom of the thickeners and pumped to the Purifax units. The thickener is equipped with an influent well, an effluent weir with scum baffle, air diffusers, sludge collecting equipment, and supernatant draw-off pipes.

The influent well, receiving influent sludge, scum, recycled sludge and forced air, breaks the force of the influent sludge.

The sludge collecting equipment includes sludge scrapers and a sludge hopper. Scrapers, set to the slope of the tank bottom, continuously revolve around the central column and scrape sludge into the hopper in the bottom center of the tank. Attached across the length of the sludge scraper support arms are many vertical spikes, called pickets, and many air diffusers. From each hopper, thickened sludge is continuously pulled by one of two variable speed plunger pumps (flow rate of 30 - 150 gpm) and discharged to the Purifax units in the sludge stabilization building.

The circular scum baffle prevents scum from flowing over the thickener weirs.

The air diffusers are in two locations; the influent well and along the scraper support arms. The air blowers (rated for ?) supply air to two valves that control whether air is directed to the influent well and/or the support arm diffusers.

The supernatant draw-off pipes intersect the thickener wall vertically every 12 inches. They are used to control the elevation from which the supernatant is drained.

The operator:

regulates influent sludge flow to control the thickener's hydraulic loading;
regulates air to the influent well to control odors;
removes and stabilizes sludge to control sludge blanket depth and
regulates valves to control supernatant draw-off and mixing.

Influent Flow Rate

Primary and secondary sludges are those removed from the bottom of the primary and secondary clarifiers and pumped to the sludge thickener. The primary sludge flow rate is controlled to maintain a low sludge blanket in the primary clarifiers (see chapter 3). The secondary sludge is controlled to maintain a target MCRT in the aeration basins (see chapter 4)..

An excessively high flow rate into the gravity thickener will both reduce the sludge blanket depth and the solids concentration of the thickened sludge. On the other hand an excessively slow flow rate may cause the thickener contents to become septic.

Operator action: Monitor influent sludge flow rate as needed. If the thickener passes excessive solids with the discharging supernatant, consider reducing the influent sludge flow rate. (Do so by coordinating the sludge pumps to avoid simultaneous operation.) If the thickener is becoming septic, consider increasing the sludge pump rates.

The maximum design sludge flow rate to the thickener is 1.0 MGD. (This is based on 800 gpd/ft^2)
The minimum design sludge flow rate is about .1 MGD.

High flow rate affects secondary treatment

- Flow rate too high → poor settling in thickener → high solids concentration in thickener supernatant → increase BOD of aeration basin influent → increased aeration in secondary treatment system → unnecessary expense.

High flow rate affects sludge thickening

- Flow rate too high → decrease in sludge blanket depth → low thickened sludge concentration → decrease in sludge stabilization efficiency → unnecessary expense.

Low flow rate affects secondary treatment

- Flow rate too low → increased sludge retention in thickener → septicity in sludge blanket → rising solids from gasification → high solids concentration in thickener supernatant → increase BOD of aeration basin influent → increased aeration in secondary treatment system → unnecessary expense.

Odor

Air is introduced into the gravity thickener influent well to control odor. The air volume is regulated with control valve 18-01.

Operator action: Monitor odor of the sludge thickener contents. Add air to the influent well when the odors are unacceptable.

- Air too high → excessive turbulence in thickener → high solids concentration in thickener supernatant → increase BOD of aeration basin influent → increased aeration in secondary treatment system → unnecessary expense.
- Air too low → ineffective aeration → odors not reduced.

Sludge Blanket Depth

The sludge blanket depth is controlled by the frequency of removal by the thickened sludge pumps to the Purifax units. (See chapter 9 for a discussion of the thickened sludge pumps.)

Operator action: Monitor sludge blanket depth daily by taking samples from supernatant draw-off pipes. When depth reaches 4 feet, withdraw thickened sludge with the thickened sludge pumps.

Note: The amount of solids inventory held in the thickener must be weighed against the potential for the sludge to become septic. Excessive solids inventory results in solids flotation, increased BOD_5, increased solids overflowing the weirs, and reduced thickening: due to gasification of the sludge.

The anticipated ideal sludge blanket depth will be determined by operator experience. However, a depth in the range of three to four feet is generally adequate thickening. Solids concentration may not increase with sludge depths over four feet and may actually decrease due to septic conditions.

High sludge blanket depth affects secondary treatment

- Too high sludge blanket depth → gasification of sludge → high BOD_5 and TSS in thickener supernatant → increase BOD of aeration basin influent → increased aeration in secondary treatment system → unnecessary expense.

High sludge blanket depth affects sludge thickening

- Too high sludge blanket depth → gasification of sludge → inadequate thickening → low solids content in sludge sent to Purifax units → ineffective stabilization → sludge stabilized a second time → unnecessary expense.

Low sludge blanket depth affects sludge thickening

- Too low sludge blanket depth → inadequate thickening → low solids content in sludge sent to Purifax units → ineffective stabilization → sludge stabilized a second time → unnecessary expense.

Mix Thickened Sludge

Mixing of thickened sludge occurs before pumping to the stabilizers to allow an even concentration supplied throughout the sludge stabilization process. The primary and secondary sludge pumps are shut down, the thickener supernatant is drawn off, and finally the thickened sludge is mixed, using air.

Operator action: When ready to stabilize the thickened sludge, perform the following steps:

1. Shut down the primary and secondary sludge pumps.
2. Open the lowest supernatant valve that does not draw sludge and allow to drain.
3. When draining is complete, close the supernatant valves and open valve 18-V208 and 18-V209 to allow air to mix the thickener solids.
4. When the scraper arm has rotated one revolution, shut down the air and begin stabilizing the sludge.

CHEMICAL BACKGROUND

Chlorine gas is fed to the plant effluent for disinfection and to the Purifax unit to stabilize sludge.

Chlorination is achieved by the reaction of chlorine gas (Cl_2) with water to form hypochlorous acid (HOCl); a powerful oxidizing agent. Other slower acting oxidizing agents, or chloramines, are also formed as a result of HOCL side reactions with ammonia. These oxidizing compounds kill microorganisms by oxidizing organic matter which is integral to the living organism and eliminates odors by oxidizing odorous compounds.

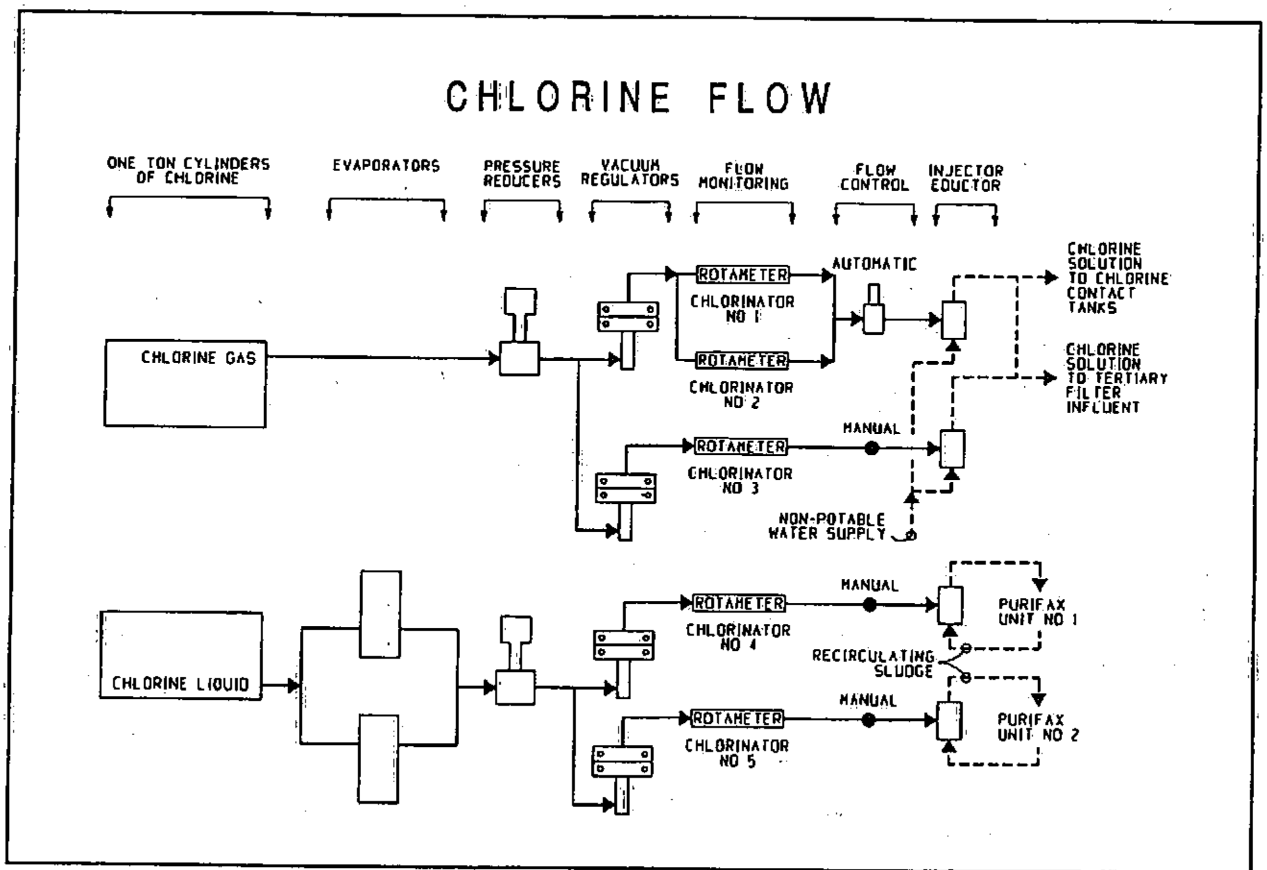


Figure 1

SYSTEM CONTROL

The chlorine feed system is divided into three basic parts: chlorine cylinder storage, evaporators, and vacuum control.

Chlorine cylinders - Liquid chlorine is delivered on site in one ton pressurized cylinders. The cylinders are stored horizontally in racks outside the chlorine room. Chlorine cylinders in use are placed on scales in the chlorine room. When a chlorine cylinder is empty, it is removed from the scales and replaced by a full cylinder. There are two scales, each holding two one-ton cylinders. The scales monitor the diminishing weight of the chlorine cylinders as the gas is removed.

Each chlorine cylinder is equipped with two valve, one positioned on top for access to gaseous chlorine and the other positioned on the bottom for liquid chlorine. The pipe connected to the upper valve directs chlorine gas to a series of controls that regulate and monitor the chlorine feed into two distribution points, tertiary filter influent and tertiary filter effluent. The pipe connected to the lower valve directs liquid chlorine to evaporators which supply chlorine gas to a gas chlorine feed system for the Purifax units.

Evaporators - Evaporators are used when a large volume of chlorine gas is needed. Liquid chlorine is accessed from the lower cylinder valve and directed to two evaporators that use heat to evaporate liquid chlorine to form chlorine gas. (Chlorine gas drawn from the top valve causes the liquid chlorine in the cylinder to evaporate. Evaporation cools the chlorine cylinders and chlorine feed equipment. Excessive evaporation causes the cylinder to reach sub-freezing temperatures, resulting in moisture condensing and freezing on the chlorine feed equipment. Alternatively, liquid chlorine is drawn from the bottom of the cylinder and allowed to evaporate in the presence of heat in the evaporator.) The chlorine gas leaves the evaporators, passing through to a series of controls that regulate and monitor chlorine feed into two distribution points, Purifax units 1 and 2.

Vacuum control - A series of controls regulate the chlorine gas feed rate. They use vacuum, formed by an ejector, to regulate the amount of chlorine gas pulled into solution with water. Chlorine gas, from both the top of the cylinders and the evaporators; use the same type of vacuum equipment for regulating its flow. The primary difference is that the vacuum control equipment for gas taken from the evaporators is considerably larger than the system receiving gas directly from the cylinders. Each control system includes a pressure regulator, vacuum regulator, heater, rotameter, flow control valve, and ejector (see figure 1). All pieces of equipment operate under a vacuum formed by the ejector.

An *ejector (in the Purifax unit the ejector is called an eductor)* provides vacuum to the chlorine control system and mixes of the chlorine gas with water (or sludge). The ejector has three connections. Two allow water (or sludge) to pass through the ejector, causing a vacuum to form at the third connection. A vacuum line passes from this third connection to the flow control valve. The ejector receives non-potable water flow, and the eductor receives recirculating sludge flow in the Purifax unit.

A *flow control valve* regulates flow of chlorine gas through the control system. Two types of flow control valves are include; manual and automatic. The manual flow control valves are mounted directly on chlorinator cabinets 2, 3, 4, and 5. The one automatic flow control valve, called a Chloromatic valve, is mounted in the chlorine feed room near and in line with the ejector used for chlorine distribution to the tertiary filter effluent. It controls chlorine gas flow through chlorinator cabinets 1 and 2 based on a signal from effluent flow meter M-11.

A *rotameter*, located in the chlorinator cabinets, registers the flow rate of chlorine gas passing through the vacuum control system.

A *heater*, attached to the inlet side of the vacuum regulator, heats the gas to prevent the pipes and control devices from freezing.

A *vacuum regulator* controls the level of vacuum in the line between the vacuum regulator and pressure regulator, based on the position of the flow control valve.

A *pressure regulator* regulates the release of chlorine gas in the pipe between the pressure regulator and vacuum regulator, based on the vacuum in the line between the pressure regulator and vacuum regulator. The pressure regulator for the Purifax units also functions as a shut-down, valve controlled by a pressure switch between the pressure regulator and vacuum regulator (see Chapter 10).

Operator action:

Add chlorine to tertiary filter by following steps outlined in Chapter 5.
Add chlorine to chlorine contact tanks by following steps outlined in Chapter 6.
Add chlorine to Purifax unit by following steps outlined in chapter 9.

SYSTEM CONFIGURATION

The chlorine gas feed system is designed to accommodate varying conditions by providing a choice of flow paths and equipment. The choices are divided into two modes of operation; normal and alternate.

Normal Operation

Normal operation occurs as described in "System Description" and is chosen when all process units and equipment are available and the plant influent flow is within design limits. Flow paths and units used for normal operation are listed below.

Units in use:	Chlorinators 1, 2, & 3 for wastewater chlorination. -and- Chlorinators 4 & 5 and Evaporators 1 & 2 for sludge stabilization.
Flow path:	from 1 ton cylinders upper valve → pressure reducing valve → heater → vacuum regulating valve → chlorinators (rotameters) 1 & 2 → Chloromatic (automatic control) valve → ejector → tertiary splitter or tertiary effluent. -and- from 1 ton cylinders upper valve → pressure reducing valve → heater → vacuum regulating valve → chlorinators (rotameters) 1 & 2 → manual control valve → ejector → tertiary splitter or tertiary effluent. -and- from 1 ton cylinders lower valve → evaporators → pressure reducing valve → heater → vacuum regulating valve chlorinators 4 & 5 → manual control valve → eductor → recirculating sludge in Purifax unit.

Alternate Operations

An alternate operation may be chosen during periods of high flow, low flow, extreme weather, mechanical failures/repairs, routine maintenance, or to implement an innovative process control strategy. An alternate operation is a modification of normal operation. Some possible modifications are listed below.

- None

CHEMICAL BACKGROUND

Sulfur dioxide is fed to the wastewater to dechlorinate or remove residual chlorine. Residual chlorine is harmful to naturally occurring organisms in the Bluestone River.

Sulfur dioxide dechlorinates by reacting with harmful oxidizing compounds, particularly hydrochlorous acid and chloramines, to form small amounts of the following harmless compounds: sulfate ions, chlorine ions, and ammonium ions. Excessive sulfur dioxide dosages wastes the chemical, lowers dissolved oxygen and pH levels, and may cause an increase in measured BOD_5 and COD. Inadequate sulfur dioxide will fail to bring plant effluent chlorine residuals to zero mg/l as required in the Town's NPDES permit. Therefore, sulfur dioxide should be added cautiously to approximate the theoretical ratio of 1.0 mg/l sulfur dioxide for each 1.0 mg/l of total chlorine residual. Sulfur dioxide feed rate is paced to the influent flow rate.

SYSTEM CONTROL

The sulfur dioxide feed system is divided into two basic parts, sulfur dioxide cylinder storage and vacuum control.

Sulfur dioxide cylinders - Liquid sulfur dioxide is delivered on-site in one ton pressurized cylinders. The cylinders are stored horizontally in racks outside the sulfur dioxide room. Sulfur dioxide cylinders in use are placed on scales in the sulfur dioxide room. Once empty, a cylinder is removed from the scales and replaced by a full cylinder one. The two scales, each holding a one ton cylinder, monitor the diminishing weight of the sulfur dioxide cylinders as the gas is removed.

Each cylinder is equipped with two valves, one positioned on top for access to gaseous sulfur dioxide and the other positioned on the bottom for liquid sulfur dioxide. A pipe is connected to the upper valve to direct sulfur dioxide gas to a series of controls that regulate and monitor sulfur dioxide feed into two distribution points, the tertiary filter influent and tertiary filter effluent.

Vacuum control - The series of controls that regulate the sulfur dioxide gas feed rate include a pressure regulator, vacuum regulator, heater, rotameter, flow control valve, and ejector . All of these pieces of equipment operate under a vacuum formed by the injector.

An *injector* provides vacuum to the sulfur dioxide control system and mixing of the sulfur dioxide gas with water and has three connections, two of the connections allow water to pass through the injector, causing a vacuum to form at the third connection. A vacuum line passes from this third connection to the flow control valve.

A *flow control valve* regulates the flow of sulfur dioxide gas through the control system. Two types of flow control valves are included, manual and automatic. Both types are mounted directly on the sulfonator cabinets controls sulfur dioxide gas flow based on a signal from effluent flow meter M-11.

A *rotameter*, located in the sulfonator cabinets, registers the flow rate of sulfur dioxide gas passing through the vacuum control system.

A *heater*, attached to the inlet side of the vacuum regulator, heats the gas to prevent pipes and control devices from freezing.

A *vacuum regulator*, located in the sulfonator, controls the level of vacuum in the line between the vacuum regulator and pressure regulator, based on the position of the flow control valve.

A *pressure regulator*, attached directly to the sulfur dioxide cylinder, regulates release of sulfur dioxide gas in the pipe between the pressure regulator and vacuum regulator, based on the vacuum in the line between the pressure regulator and vacuum regulator.

Operator action:

Add sulfur dioxide to chlorine contact tank effluent according to guidelines outlined in Chapter 6.

SYSTEM CONFIGURATION

The sulfur dioxide gas feed system is designed to accommodate varying conditions by providing a choice of flow paths and equipment. The choices are divided into two modes of operation; normal and alternate.

Normal Operation

Normal operation occurs as described in "System Description" and is chosen when all process units and equipment are available and the plant influent flow is within design limits. Flow paths and units used for normal operation are listed below.

Units in use:	Sulfonators 1, & 2 for wastewater dechlorination.
Flow path:	from 1 ton cylinders upper valve → vacuum regulating valve → heater → sulfonators (rotameter) 1 & 2 → injector → chlorine contact tank effluent.

Alternate Operations

An alternate operation may be chosen during periods of high flow, low flow, extreme weather, mechanical failures/repairs, routine maintenance, or to implement an innovative

PART IV - SUPPORT SYSTEMS

CHAPTER 18
EMERGENCY STORAGE AND PUMPING

TABLE OF CONTENTS

SYSTEM DESCRIPTION

The Westside WWTP includes a wastewater storage system that diverts flows over 13.25 mgd to emergency storage tanks. The storage system includes four components; the overflow box, flow diversion box, Bluestone Pump Station, and 12 storage tanks.

Overflow Box

The overflow box receives all the plant influent wastewater. It is located on the influent pipeline ahead of the flow diversion box. When the plant influent flow exceeds 13.25 mgd and all the emergency holding tanks are full. The overflow box will divert influent flow in excess of 13.25 to the Bluestone River (see Figure 3).

Flow Diversion Box

The flow diversion box receives plant influent wastewater from the overflow box. It is located between the overflow box and the WWTP main pump station. When the plant influent flows exceeds 13.25 mgd (and gates 1-01 and 1-02 are open), it overflows two weirs in the diversion box and discharges to the Bluestone pump station wet well (see figure 2). When the emergency holding tanks are full, gates 1-01 and 1-02 are closed to stop flow to the Bluestone pump station. Then, excess flow backs up the sewer and eventually overflows to the Bluestone river from the overflow box (see figure 3).

Bluestone Pump Station

The Bluestone pump station receives influent flow from the flow diversion box. The influent wastewater passes through a mechanical bar screen where solids are removed and dropped into a grinder. The grinder returns shredded solids back into the wastewater on the other side of the screen. It reduces the size of influent solids, permitting them to readily pass through the raw sewage pumps in the Bluestone pump station.

Wastewater flows from the mechanical bar screen to the Bluestone pump station wet well. This well supplies wastewater to the two sewage pumps located in a dry well adjacent to the wet well. The two raw sewage pumps (each rated for 2700 to 4200 gpm or 4.0 to 6.0 MGD) lift wastewater from the wet well (a maximum of 12 mgd) to the emergency holding tanks. The two variable speed pumps stop, start, and vary their speed in relation to the liquid level in the wet well so that they pump the wastewater at a rate that matches the pump station influent flow rate (see "Instrumentation").

Liquid level in the wet well is measured with a "Liquid Level Rheostat" that works as follows:

The liquid level bubbler provides a continuous stream of air to a tube immersed in the wet well wastewater. As the wet well liquid level rises over the end of the bubbler tube, pressure within the bubbler tube increases. This pressure is directed to the liquid rheostat to control pump speed.

The liquid rheostat provides variable power to the pump motor. This rheostat includes a reservoir and a loadCEL, each connected to each other by a common pipe. Through the common pipe, they share the same electrolyte that carries specific electrical conducting properties. The loadCEL is open to atmosphere, and the reservoir is enclosed, including an air trap in its top that shrinks and expands in response to varying air pressure from the bubbler. The electrolyte in the reservoir varies as air volume expands and shrinks in response to wet well liquid level. The changing air volume in the reservoir pushes and pulls electrolyte through the common pipe that leads to the loadCEL. The resultant volume change in the loadCEL causes its liquid level to rise and fall, changing the depth that two electrodes are immersed in the electrolyte. The two electrodes placed in the loadCEL carry power through the electrolyte as it supplies power to the pump motor. As the electrolyte depth changes, the electrodes vary voltage supplied to the pump motor, resulting in variable motor speed.

The pump sequence works as follows:

With a rising water level:

- When wastewater level in the wet well rises to a preset level (see Table 1 on page 17-15) the controller starts one variable speed pump (the base pump). As the liquid level in the wet well continues to rises the pump speed increases to allow the pump flow rate to match the influent flow rate.
- If the base pump is running at maximum speed and the liquid level continues to rise, a second pump (first standby pump) will start. Both pumps will adjust to the same speed in order to pump at the same rate as the influent flow rate.
- If the liquid level continues to rise and reaches a set level, both pumps will reach their maximum speed.

With a falling water level:

- If both pumps are running at minimum speed and the liquid level drops to a set liquid level; the standby pump will stop. The base pump will adjust its speed to match the influent flow rate.
- If the base pump is running a minimum speed and the liquid level drops to a set liquid level, the base pump will stop.

Emergency Holding Basins

The emergency holding tanks are housed in two structures. One contains tanks 1 and 2, and the other contains tanks 3 through 12 (tanks 13 and 14 are not available). Tanks 1 and 2, which receive the Bluestone pump station discharge, each hold 0.3 MG of wastewater before automatically overflowing to tank 3 and/or tank 12. Tanks 3 through 10 fill when valve 2-241M is open, and tanks 12 and 11 fill when valve 2-242M is open (see drawing 2 in Appendix V). Each of tanks 3 - 12 hold 0.2 MG. When all the tanks are full (all twelve tanks hold 2.6 MG), the Bluestone pump station is manually shut down.

When the Bluestone pump station is pumping at a maximum capacity of 12 MGD, tanks 1 and 2 simultaneously fill in 132 minutes, and tanks 3 - 12 fill in 24 minutes per tank. Therefore all the emergency storage tanks will fill in about 5.2 hours with the Bluestone pump station running continuously at maximum capacity.

If the flow rate into the Bluestone pump station exceeds 12 MGD; the wet well level will continue to rise until it overflows. To prevent flooding of the pump station basement when the Bluestone influent flow rate approaches 12 MGD, slide gates 1-01 and 1-02 should be lower to restrict flow to the pump station.

The emergency holding tanks are drained when the influent wastewater drops below 13.25 mgd (see figure 4). Each tank is manually drained by slowly and completely draining one tank at a time, beginning with the last tank filled.

INFLUENT FLOW
NORMAL FLOW
Flow under 13.25

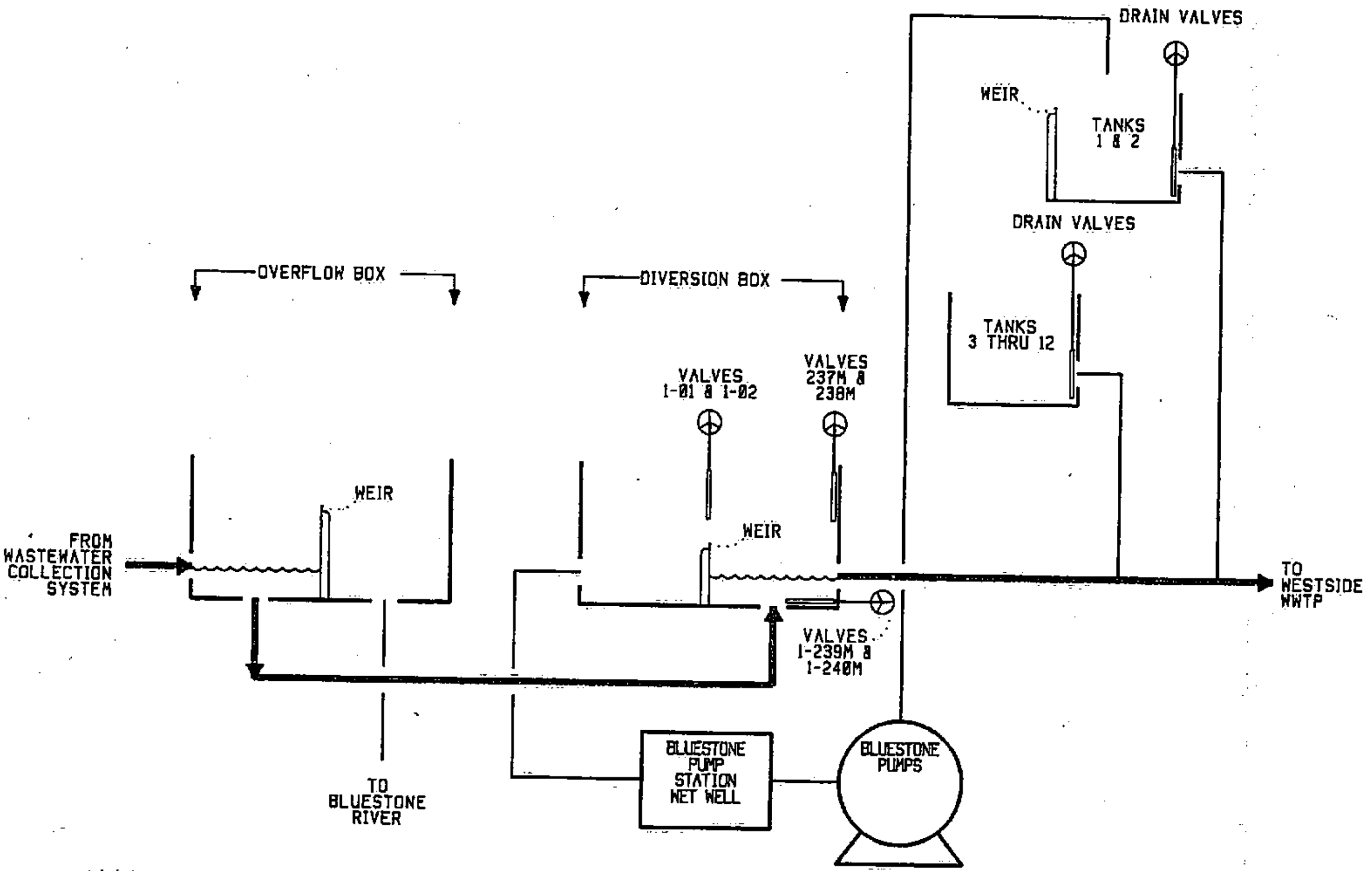


Figure 1

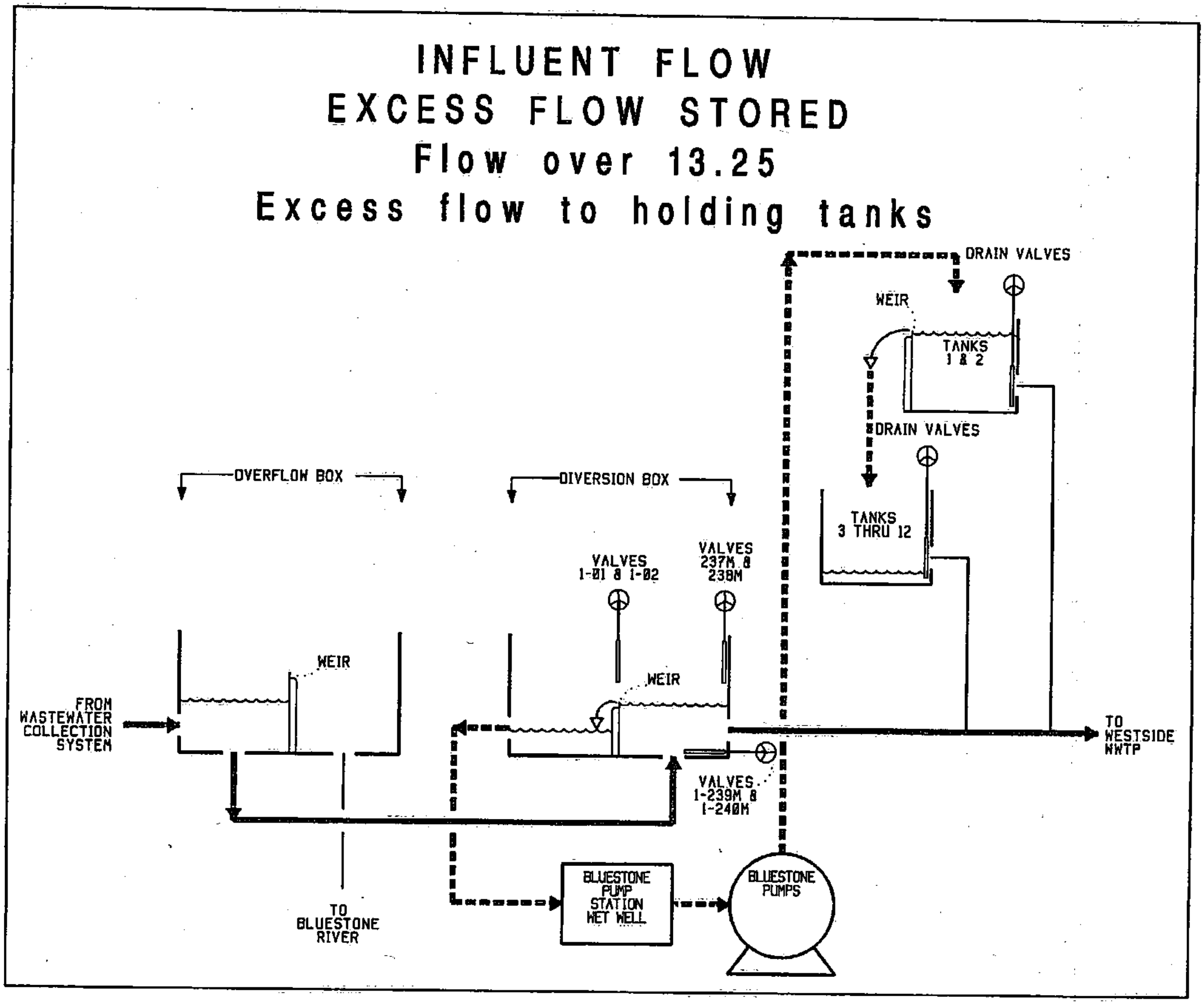

INFLUENT FLOW
EXCESS FLOW STORED
Flow over 13.25
Excess flow to holding tanks
DRAIN VALVES
WEIR
TANKS 1 & 2
DRAIN VALVES
TANKS 3 THRU 12
OVERFLOW BOX
DIVERSION BOX
VALVES 1-01 & 1-02
VALVES 237M & 238M
WEIR
WEIR
FROM WASTEWATER COLLECTION SYSTEM
TO WESTSIDE WWTP
VALVES 1-239M & 1-240M
TO BLUESTONE RIVER
BLUESTONE PUMP STATION WET WELL
BLUESTONE PUMPS

Figure 2

INFLUENT FLOW
EXCESS FLOW OVERFLOWS
Flow over 13.25
Holding tanks full - excess flow to River

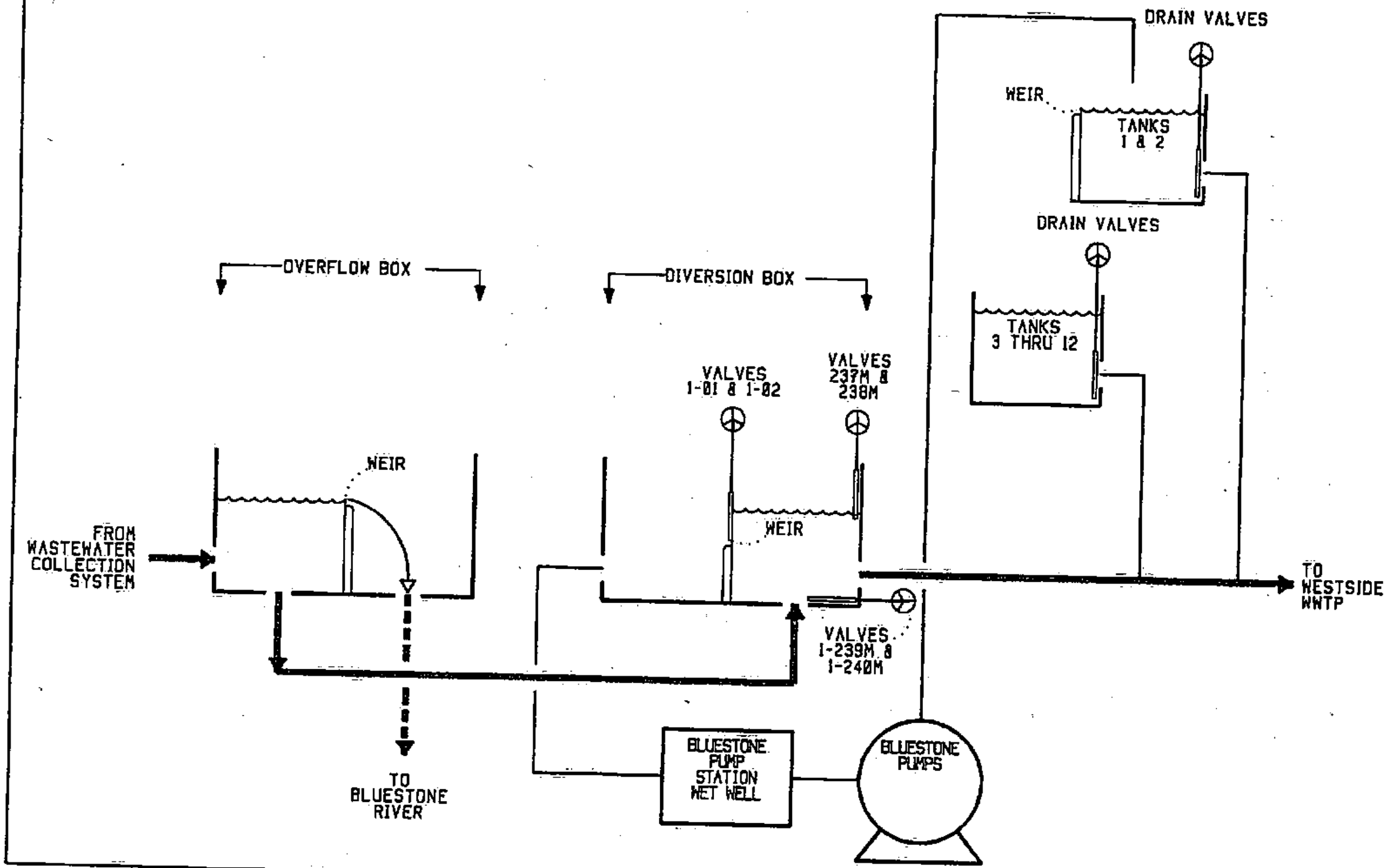


Figure 3

INFLUENT FLOW
STORED FLOW RELEASED
Flow under 13.25
Holding tanks drained to WWTP

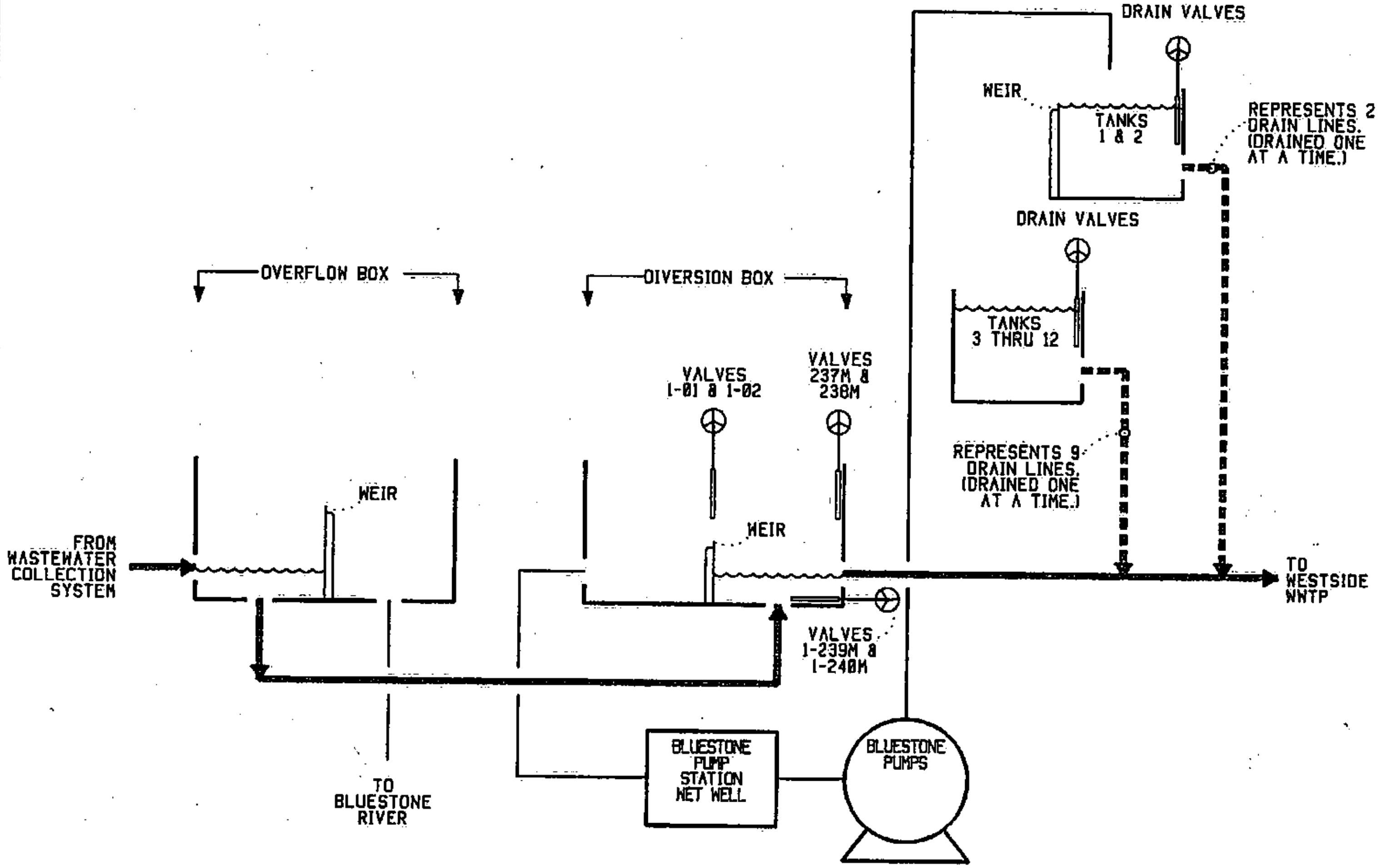


Figure 4

SYSTEM CONTROL

The emergency storage and pumping system is controlled to divert flow to the storage tanks, and then to drain stored wastewater back to the influent pipeline.

Divert Flow

Flow is diverted to the emergency storage tanks for two reasons. One is to store excess influent flow (over 13.25 mgd). The second, is to receive and drain flow from the Bluestone pump station during low flow periods to keep the pump station in working order and from going septic.

Emergency Storage

Emergency storage is provided to prevent the overflow of influent wastewater into the Bluestone River.

Operator action: Set diversion box weir level to accept flows exceeding maximum desired influent flow rate to WWTP.

The maximum design flow rate into the Westside WWTP is 13.25 MGD.

Keep Pump Station in Working Order

Emergency storage tanks 1 and 2 accept routine flow from the Bluestone pump station to prevent the wet well contents from becoming septic, and to ensure that the pumping system is always ready for an emergency overflow from the diversion box weirs.

Operator action: Set diversion box valves 1-01 and 1-02 to cause influent wastewater to overflow the diversion box weirs when the diurnal influent is near its peak flow rate.

The intention of this set-up is to allow enough wastewater to enter the Bluestone wet well in the course of one day and to cause the wet well to fill at least one time. The pumps will then start-up, drain the wet well, and discharge to tanks 1 and 2.

Drain Stored Wastewater

Stored wastewater is drained to the Westside WWTP from the holding tanks in two situations: first, to drain emergency stored wastewater and second, to immediately drain routine pump station discharge.

Emergency Storage

The emergency storage tanks, having been filled with excess influent flow, are slowly drained back into the plant influent pipeline to be treated at the WWTP.

Operator action: Begin draining holding tanks when influent flow has dropped below 12.25. Drain one holding tank at a time, beginning with the most recently filled tank. Drain slowly to prevent hydraulic surges into the WWTP.

Routine Pump Station Discharge

The emergency storage tanks 1 and 2, when receiving routine pump station discharge, are set to immediately, and slowly, drain to the WWTP influent pipeline.

Operator action: Open the drain gates holding on tank 1 and 2. (2-223M and 2-224M) to allow the stored wastewater to immediately drain back to Westside WWTP. Drain slowly to prevent hydraulic surges into the WWTP.

This is done to routinely operate to keep the Bluestone pump station (when the influent flows are under 13.25) to keep it in good working order.

SYSTEM CONFIGURATION

The Bluestone pumping system and the emergency holding tanks are designed to accommodate varying conditions by providing a choice of flow paths and equipment. The choices are divided into two modes of operation; normal and alternate.

Normal Operation

Normal operation is chosen when all process units and equipment are available and the plant influent exceeds 13.25 mgd causing flow to enter the Bluestone pump station wet well. Flow paths and units used for normal operation are listed below.

Units in use:	one mechanical screen, one grinder, 2 variable speed pumps,
Units bypassed:	none
Flow path to storage:	from overflow box → diversion box → mechanical screen → pump station wet well → raw sewage pumps → holding tanks 1 and 2 → holding tank 3 → holding tank 4 → etc.
Flow path from storage:	from holding tank 12 → main pump station influent; then from holding tank 11 → main pump station influent; then from holding tank 10 → main pump station influent; etc.

Alternate Operation

An alternate operation may be chosen during periods of high flow, low flow, extreme weather, mechanical failures/repairs, routine maintenance, or to implement an innovative process control strategy. An alternate operation is a modification of normal operation. Some possible modifications are listed below.

PART IV - SUPPORT SYSTEMS

CHAPTER 19
MAIN PUMP STATION

TABLE OF CONTENTS

SYSTEM DESCRIPTION

The main pump station uses two coarse screens to remove large debris in the raw sewage (see Chapter 2). The screened wastewater flows to the pumping system that pumps a maximum of 13.25 mgd of wastewater to the preliminary treatment building.

The raw sewage pumping system utilizes a wet well, a dry well, two constant speed pumps and two variable speed pumps. Each of the constant speed pumps is rated for a maximum of 7500 GPM. Each of the variable speed pumps is rated for a maximum of 4200 GPM.

All four pumps are located in a dry well, and are each automatically controlled by an automatic pump control system.

Pump Control System

A liquid level transducer, a programmable pump controller (D620 controller), 2 floats, and 2 VFD drive units are coordinated to provide the necessary speed and number of pumps for matching the influent flow. The liquid level transducer senses the level in the wet well and sends a level signal to the pump controller. Each variable speed pump (P10 and P20) is controlled by its respective VFD drive unit. The VFD drive unit receives a pump speed signal from the pump controller. Each constant speed centrifugal pump (P30 and P40) pump is controlled for start and stop by the D620 controller.

The pump control (see Table 1 on page 17-7 and Table 2 on page 17-8) works as follows:

With a rising water level:

- When water is first introduced into the wet well the pumps are controlled by the D620 microprocessor.
- When water is first introduced into the wet well and has reached a preset level, the controller starts one variable speed pump (lead pump P10 or P20). As the liquid level in the wet well rises the pump speed increases so that the pump flow rate matches the influent flow rate.
- If the lead pump reaches full speed and the liquid level continues to rise, a second variable speed pump (first lag pump P10 or P20) starts and both pumps adjust to the same variable speed to match the influent flow rate.
- If, when both pumps are running at full speed the liquid level continues to rise, a constant speed pump (second lag pump P30 or P40) starts and runs at full speed and both variable speed pumps stop.
- If, with one constant speed pump running, the liquid level continues to rise, two float switches will rise; first one then the other. When the top float switch is raised, control is taken from the D620 controller. The float switch runs one variable speed pump (P10 or P20) and one constant speed pump (P30 or P40).

With a falling water level:

- When the liquid level drops below the bottom float switch, control is returned to the D620 controller which causes one constant speed pump to turn on and the variable speed pump to stop.
- If, with one constant speed pump on, the liquid level continues to drop, the constant speed pump stops and both variable speeds pumps start. The variable speed pumps adjust to the same speed to match the influent flow rate.
- If, when both variable speed pumps are running at minimum speed, the liquid level continues to drop, the lag variable speed pump stops and the lead pump adjusts it's speed to match the influent flow rate.
- If, when one variable speed pump (the lead pump) is running at minimum speed, the liquid level continues to drop, the lead pump stops.

SYSTEM CONFIGURATION

The pumping system is designed to accommodate varying conditions by providing a choice of flow paths and equipment. The choices are divided into two modes of operation; normal and alternate.

Normal Operation

Normal operation is chosen when all process units and equipment are available and the plant influent flow is within design limits. Flow paths and units used for normal operation are listed below.

Units in use:	2 variable speed pumps, two constant speed pumps
Units bypassed:	none
Liquid flow path:	from collection system → coarse mechanical screen → main pump station wet well → main pumps → fine mechanical screen

The liquid level stop/start points are set as listed in table 1 and table 2 (see pages 17-7 and 17-8).

Alternate Operation

An alternate operation may be chosen during periods of high flow, low flow, extreme weather, mechanical failures/repairs, routine maintenance, or to implement an innovative process control strategy. An alternate operation is a modification of normal operation. Some possible modifications are listed below.

No alternate operations are available.

ATTACHMENT 2

Topographic Map

Wyatt,Frederick

From: Frazier,Teresa
Sent: Tuesday, October 28, 2008 11:13 AM
To: Wyatt,Frederick
Cc: Newman,Allen; Artrip,Steve; McCroskey,Jason; Trent,Mark; crshaheen@deq.
Subject: VPDES outfall river mile corrections on Bluestone River

Fred,
I have made the following corrections in CEDS:

Permit#	facility	OLD rivermile	corrected river mile
VA0025054	Bluefield Westside	9-BST025.64	9-BST069.39
VA0062561	Falls Mills	9-BST022.49	9-BST066.24

Teresa Frazier

355 Deadmore Street
PO Box 1688
Abingdon, VA 24212-1688
voice...276.676.4805
fax......276.676.4899

1 MILE

ROAD CLASSIFICATION

Heavy-duty — Light-duty

Medium-duty — Unimproved dirt

U. S. Route — State Route

QUADRANGLE LOCATION

BRAMWELL, W. VA.—VA.

SE/4 BRAMWELL 15' QUADRANGLE

N3715—W8115/7.5

1962

PHOTOREVISED 1979

AMS 4758 IV SE—SERIES V854

Revisions shown in purple compiled in cooperation with Commonwealth of Virginia agencies from aerial photographs taken 1976 and other source data. This information not field checked. Map edited 1979

Boundary lines shown in purple compiled from latest information available from the controlling authority

ATTACHMENT 3

Permit Limitations Development

MEMORANDUM

DEPARTMENT OF ENVIRONMENTAL QUALITY - WATER DIVISION
Water Quality Assessments and Planning
629 E. Main Street P.O. Box 10009 Richmond, Virginia 23240

SUBJECT: Flow Frequency Determination
Bluefield Westside WWTP - VA#0025054

RECEIVED
OCT 14 1998
DEQ-SWRO

TO: Fred Wyatt, SWRO

FROM: Paul E. Herman, P.E., WQAP Paul

DATE: October 13, 1998

COPIES: Ron Gregory, Charles Martin, File

The Bluefield Westside WWTP discharges to the Bluestone River near Bluefield, VA. Stream flow frequencies are required at this site for use by the permit writer in developing effluent limitations for the VPDES permit.

The USGS operated a continuous record gage on the Bluestone River at Falls Mills, VA (#03177710) from 1981 to 1996. The gage was located at the Route 717 bridge in Tazewell County, VA. The flow frequencies for the gage and the discharge point are presented below. The values at the discharge point were determined by drainage area proportions and do not address any withdrawals, discharges, or springs lying between the gage and the outfall.

The volume of the Bluefield Westside WWTP discharge must be subtracted from the flow frequencies for the discharge point because the majority of the water coming into the plant is withdrawn from a different river basin.

Bluestone River at Falls Mills, VA (#03177710):

Drainage Area = 44.2 mi^2

1Q10 = 6.9 cfs High Flow 1Q10 = 7.4 cfs
7Q10 = 8.6 cfs = 5.56 MGD High Flow 7Q10 = 12 cfs = 7.76 mg/l
30Q5 = 12 cfs HM = 28 cfs

Bluestone River at discharge point:

Drainage Area = 39.8 mi^2

1Q10 = 6.2 cfs = 4.0 MGD High Flow 1Q10 = 6.7 cfs = 4.3 MGD
7Q10 = 7.7 cfs = 5.0 MGD High Flow 7Q10 = 11 cfs = 7.1 MGD
30Q5 = 11 cfs = 7.1 MGD HM = 25 cfs = 16.2 MGD

The high flow months are January through May. If you have any questions concerning this analysis, please let me know.

3.0 MGD average STP flow must be substracted from the above.

1Q10 = 1.0 MGD HF 1Q10 = 1.3 MGD
7Q10 = 2.0 MGD HF 7Q10 = 4.1 MGD
30Q5 = 4.1 MGD HM = 13.2 MGD
30Q10 = 1.7 MGD HF 30Q10 = 4.1 MGD

STA ID	DATE	Temp	pH	Amm	00610_Com	00900_Hardr
9-BST023.05	8/5/2003	17.9	7.8			
9-BST023.05	7/21/2003	20.7	8.24			
9-BST023.05	6/9/2003	18.1	8.12			
9-BST023.05	5/21/2003	14.6	7.73			
9-BST023.05	4/21/2003	15.21	8.36			
9-BST023.05	3/4/2003	6.38	7.45			
9-BST023.05	2/18/2003	5.67	7.7			
9-BST023.05	1/27/2003	0.05	7.49			
9-BST023.05	12/16/2002	7.21	7.51			
9-BST023.05	11/21/2002	9.53	7.75			
9-BST023.05	10/2/2002	17.7	7.86			
9-BST023.05	9/17/2002	19.21	7.53			
9-BST023.05	9/5/2002	18.2	7.56			
9-BST023.05	9/5/2002	18.2	7.56			
9-BST023.05	8/28/2002	18.8	7.45			
9-BST023.05	3/12/2001				0.04 U	122
9-BST023.05	2/20/2001	8.4	7.93		0.07	140
9-BST023.05	1/10/2001	0.12	7.63		2.32	200
9-BST023.05	12/18/2000	2.8	7.27		0.95	177
9-BST023.05	11/2/2000	10.9	7.47		1.37	179
9-BST023.05	10/12/2000	10.5	8.03 90th %		0.3	159
9-BST023.05	9/27/2000	14.2	7.9		0.68	165
9-BST023.05	8/7/2000	20.8	8.02		0.04 U	178
9-BST023.05	7/24/2000	17.29	7.83		0.04 U	180
9-BST023.05	6/21/2000	22.7	7.78		0.12	184
9-BST023.05	5/15/2000	16.2	8.2		0.04 U	142
9-BST023.05	4/5/2000	8.9	7.95		0.04 U	119
9-BST023.05	3/15/2000	10.4	8.19		0.33	131
9-BST023.05	2/23/2000	10.6	8.16		0.04 U	156
9-BST023.05	1/25/2000	0.7	8.22 90th %		0.04 U	217

Mixing Zone Predictions for Bluefield Westside

Effluent Flow = 8.1 MGD
Stream 7Q10 = 2.0 MGD
Stream 30Q10 = 1.7 MGD
Stream 1Q10 = 1.0 MGD
Stream slope = .0039 ft/ft
Stream width = 15 ft
Bottom scale = 3
Channel scale = 1

Mixing Zone Predictions @ 7Q10

Depth = 1.2029 ft
Length = 166.8 ft
Velocity = .8665 ft/sec
Residence Time = .0022 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 7Q10 may be used.

Mixing Zone Predictions @ 30Q10

Depth = 1.1801 ft
Length = 169.78 ft
Velocity = .857 ft/sec
Residence Time = .0023 days

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 30Q10 may be used.

Mixing Zone Predictions @ 1Q10

Depth = 1.121 ft
Length = 178.47 ft
Velocity = .834 ft/sec
Residence Time = .0594 hours

Recommendation:

A complete mix assumption is appropriate for this situation and the entire 1Q10 may be used.

CALCULA OF TOTAL AMMONIA NITRO IMITS

FACILITY: Bluefield Westside WWTP

NH_3 limits are derived from the ammonia tables or formulas in the Water Quality Standards. Human health criteria are not applicable for ammonia.

The following stream parameter values are being used for the calculations:

Dry Season pH = 8.0 Dry Season Temperature = 21

Wet Season pH = 8.2 Wet Season Temperature = 15

The derived ammonia nitrogen water quality criteria are:

Acute: AC_{dry} = 8.40 AC_{wet} = 5.72

Chronic: CC_{dry} = 1.6 CC_{wet} = 1.71

The following flows apply:

Q_e	=	Design Flow of STP (MGD)	= 8.1
Q_{s-1}	=	1Q10 Streamflow (MGD)	= 1.0
Q_{s-1w}	=	HF 1Q10 Streamflow (MGD)	= 1.3
Q_{s-30}	=	30Q10 Streamflow (MGD)	= 1.7
Q_{s-30w}	=	HF 30Q10 Streamflow (MGD)	= 4.1

The water quality wasteload allocations are calculated as follows, assuming assuming a background concentration of 0;

f = fraction of stream flow to use from MIX Program

Dry WLA = $[AC_{dry}((f)Q_{s-1} + Q_e) - (f)(Q_{s-1})(NH_3\text{-N background})] / Q_e$

" $=(6.95)(1.0 + 8.1)/8.1 = 7.8$ mg/l

Wet WLA = $[AC_{wet}((f)Q_{s-1w} + Q_e) - (f)(Q_{s-1w})(NH_3\text{-N background})] / Q_e$

" $=(5.72)(1.3 + 8.1)/8.1 = 6.6$ mg/l

Dry WLA = $[CC_{dry}((f)Q_{s-30} + Q_e) - (f)(Q_{s-30})(NH_3\text{-N background})] / Q_e$

" $=(1.6)(1.7 + 8.1)/8.1 = 1.9$ mg/l

Wet WLA = $[CC_{wet}(f)(Q_{s-30w} + Q_e) - (f)(Q_{s-30w})(NH_3\text{-N background})] / Q_e$

$1.71(4.1 + 8.1)/8.1 = 2.6$ mg/l

3/10/2006 10:46:49 AM

Facility = Bluefield Westside WWTP, Dry
Chemical = Ammonia Nitrogen
Chronic averaging period = 30
WLAa = 7.8
WLAc = 1.9
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 5
Variance = 9
C.V. = 0.6
97th percentile daily values = 12.1670
97th percentile 4 day average = 8.31895
97th percentile 30 day average= 6.03026
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 3.83357317749099
Average Weekly limit = 2.80404294886448 ≈ 2.8 mg/l
Average Monthly LImit = 2.08864549551673 ≈ 2.1 mg/l

The data are:

5

3/9/2006 9:09:55 AM

Facility = Bluefield WWTP _ Wet Season
Chemical = Ammonia Nitrogen
Chronic averaging period = 30
WLAa = 6.6
WLAc = 2.6
Q.L. = 0.2
# samples/mo. = 12
# samples/wk. = 3

Summary of Statistics:

observations = 1
Expected Value = 9
Variance = 29.16
C.V. = 0.6
97th percentile daily values = 21.9007
97th percentile 4 day average = 14.9741
97th percentile 30 day average= 10.8544
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 5.24594224288241
Average Weekly limit = 3.83711140370929 ≈ 3.8 mg/l
Average Monthly LImit = 2.85814646754921 ≈ 2.9 mg/l

The data are:

9

Chlorine/E-Coli Surragate Study
WASTEWATER TREATMENT PLANT-VPDES PERMIT No. VA0025054
FIELD DATA SHEET

DATE	SAMPLE TIME	COLLECTED BY	ANALYZED BY	PLANT FLOW (MGD)	CL2 RESIDUAL	(1-5) Contact Tank Capacity (MG/TANK)	SUSPENDED SOLIDS (MG/L)	Chlorine Contact Tank Detention Time (Minutes)	E-COLI DEQ LIMIT 126 Geo Mean. (235 MAX)	NOTES/COMMENTS	HOLDING TIME
05/12/2003	10:00a,m,	RH	OLVER	2	1.85	0.024703	2.2	88.93	ND	5 tanks open	6 hr. 30 mi
05/14/2003	12:00p.m.	S.B. CLJR	OLVER	1.7	1.84	0.024703	4.7	62.77	ND	3 tanks open	4 hr.
05/16/2003	10.05a.m.	RH	OLVER	4.5	1.02	0.024703	3.6	23.71	2	3 tanks open	6 hr. 15 mi
05/19/2003	10:10a,m.	RH LA	OLVER	4.4	1.06	0.024703	4.6	24.25	ND	3 tanks open	6 hr. 40 mi
05/21/2003	10:05a.m.	RH	OLVER	6.3	1.03	0.024703	10.4	28.23	ND	5 tanks open	6 hr. 30 mi
05/23/2003	10:00a,m,	RH BLS	OLVER	3.5	1.02	0.024703	1.1	50.82	ND	5 tanks open	6 hr. 10 mi
05/25/2003	10:;00a.m.	BLS	OLVER	2.1	1.02	0.024703	1.3	84.7	ND	5 tanks open	5 hr. 30 mi
05/27/2003	10:05a.m.	RH	OLVER	2.4	1.09	0.024703	1.4	59.29	11	4 tanks open	5 hr. 20 mi
05/30/2003	10:10a,m.	RH	OLVER	3.3	1.41	0.024703	0.6	43.12	ND	4 tanks open	3 hr. 55 mi
06/02/2003	10:10a,m.	RH	OLVER	4.2	1.92	0.024703	0.8	33.88	ND	4tanks open	5 hr. 40 mi
06/04/2003	10:05a.m.	RH	OLVER	3.5	1.04	0.024703	0.4	40.65	ND	4tanks open	5 hr. 45 mi
06/06/2003	10:00a.m.	RH	OLVER	2.4	1.09	0.024703	0.8	74.11	ND	5tanks open	5 hr. 45 mi
06/09/2003	2:00p.m.	RH	OLVER	3.4	1.68	0.024703	1	30.49	ND	3tanks open	2 hr. 25 mi
06/11/2003	2:00p.m.	RH	OLVER	4	1.01	0.024703	0.8	26.68	ND	3tanks open	2 hr. 45 mi
06/13/2003	12:15p.m.	RH	OLVER	3	1.85	0.024703	1.1	35.57	2	3tanks open	4 hr. 40 mi

Calculation of Total Residual Chlorine

Facility Name: Bluefield WWTP - 8.1 MGD
VPDES Permit No: VA0025054

ACUTE

$$WQ\text{-}WLA = \frac{[Ao_d(Qs\text{-}1_{dry} + Qe) - Qs\text{-}1_{dry}(background)]}{Qe}$$

$$WQ\text{-}WLA_{ad} = [0.019(1.0 + 8.1) - 0]/8.1 = 0.02 \text{ mg/l}$$

CHRONIC

$$AWLA_{cd} = \frac{[Co_d(Qs\text{-}7_{dry} + Qe) - Qs\text{-}7_{dry}(background)]}{Qe}$$

$$AWLA_{cd} = [0.011(2.0 + 8.1) - 0]/8.1 = 0.014 \text{ mg/l}$$

The effluent limitations were calculated using the new WLA322 Program. See attached computer printout on the next page.

3/10/2006 11:40:11 AM

Facility = Bluefield Westside WWTP
Chemical = Total Residual Chlorine
Chronic averaging period = 4
WLAa = 0.021
WLAc = 0.014
Q.L. = 0.1
# samples/mo. = 30
# samples/wk. = 7

Summary of Statistics:

observations = 1
Expected Value = .2
Variance = .0144
C.V. = 0.6
97th percentile daily values = .486683
97th percentile 4 day average = .332758
97th percentile 30 day average= .241210
< Q.L. = 0
Model used = BPJ Assumptions, type 2 data

A limit is needed based on Chronic Toxicity
Maximum Daily Limit = 2.04760469767452E-02
Average Weekly limit = 1.25048694544914E-02 ≈ 0.012 mg/l
Average Monthly LImit = 1.01483622340237E-02 ≈ 0.010 mg/l

The data are:

0.2

MODEL FILE AND STREAM INSPECTION REPORT FORM

Discharge Name: Bluefield Westside WWTP

Location: Tazewell Co.

Model File Path/Name: ______

Inspection Date: ___/___/___ Modeler: F. M. Wyatt

General Stream Information:

Stream Name: Bluestone River

Basin: New River Section: 1g Class: IV Special Standards: v

Are the standards for this stream violated due to natural causes? (Y/N) N

Is the stream correctly classified? (Y/N) Y

If "N", what is the correct classification? ______

Model Segmentation:

Number of segments to be modeled: 1

Flow Gauge / Flow Frequency Information (Attach Copy):

Gauge Used: Bluestone River at Falls Mills

Drainage Area/Observed Flow At The Gauge: 44.2 sq. mi./mgd

Drainage Area/Observed Flow At The Start of The Model: 39.8 sq. mi./mgd

7Q10 of the Gauge: 2.56 mgd

Flow Adjustment for Springs or Dischargers: ______ mgd

Background Water Quality:

Elevation at the Start of the model: 2355 ft above mean sea level

Elevation at the End of the model: 2320 ft above mean sea level

Critical Temperature: 21° - Dry, 15° - Wet C (attach data and analysis)

Ambient Monitoring Gauge Used: ______

Additional Discharges Information:

Is there a discharger within 3 miles upstream of the proposed discharge? (Y/N) N

Does antidegradation apply to this analysis? (Y/N) N If so, which segment(s)? ______

Is any segment on the current 303(d) list for D.O. violations? (Y/N) N

Is any segment of the model within an approved D.O. TMDL segment? (Y/N) N

Is any discharge to the model intermittent? (Y/N) N

Any dams in stream section being modeled? (Y/N) N

Notes/Sketch:

MODEL FILE AND STREAM INSPECTION REPORT FORM
Page 2

(Fill In This Page FOR EACH SEGMENT To Be Modeled)

Segment Number:		
Reason for Defining Segment:	Discharge at Beginning of Segment	X
	Physical Change at Beginning of Segment	
	Tributary at Beginning of Segment	
Length of Segment (mi.):		1.7
Drainage Area at Start of Segment (sq. mi.):		44.2
Drainage Area at End of Segment (sq. mi.):		50.0
Elevation at Start of Segment (ft.):		2355
Elevation at End of Segment (ft.):		2320
If Discharge or Tributary At Beginning of Segment, Complete the Following:		
Discharge/Tributary Name:	Bluefield Westside WWTP	
Discharge/Tributary Temperature (C): (If different from background ambient)		23
Critical Discharge/Tributary Flow (mgd): (Design/Permitted Flow or 7Q10 Condition) (use permitted or design flow for discharges, 7Q10 flow from flow frequency analysis for tributaries)		8.1
For Dischargers Only: (use permitted Concentrations)	$CBOD_5$ (mg/l):	5.8
	TKN (mg/l):	4.9
	D.O. (mg/l):	6.5

General Type of Cross Section in Segment: (7Q10 Condition)
Rectangular X Triangular ___ Deep Narrow U ___ Wide Shallow Arc ___ Irregular ___ No Defined Channel ___

General Channel Characteristics of Segment: (7Q10 Condition)
Mostly Straight ___ Moderately Meandering X Severely Meandering ___ No Defined Channel ___

Does the stream have a pool and riffle character (Y/N)? (7Q10 Condition)			Y
If "Y":	% of length that is pools 50	Average depth of pools (ft) ___	
	% of length that is riffles 50	Average depth of riffles (ft) ___	
Bottom:	Sand ___ Silt ___ Gravel ___ Small Rock X Large Rock ___ Boulders ___		
Sludge Deposits:	None X Trace ___ Light ___ Heavy ___		
Plants:	Rooted:	None X Few ___ Light ___ Heavy ___	
	Algae:	None X Film on Edges Only ___ Film on Entire Bottom ___	
Projected 7Q10 Width of Segment (ft): (must be projected by modeler based on site visit)			8
Projected 7Q10 Depth of Segment (ft): (can be calculated by model based on width)			.5
Projected 7Q10 Velocity of Segment (ft): (can be calculated by model based on width)			.23
Does the water have an evident green color? (Y/N)			N

REGIONAL MODELING SYSTEM VERSION 4.0
Model Input File for the Discharge to BLUESTONE RIVER.

File Information

File Name:	C:\ABGDN\FREDWORK\Bluefield Model.mod
Date Modified:	March 10, 2006

Water Quality Standards Information

Stream Name:	BLUESTONE RIVER
River Basin:	New River Basin
Section:	1g
Class:	IV - Mountainous Zones Waters
Special Standards:	u

Background Flow Information

Gauge Used:	Bluestone River at Falls Mills
Gauge Drainage Area:	44.2 Sq.Mi.
Gauge 7Q10 Flow:	2.56 MGD
Headwater Drainage Area:	39.8 Sq.Mi.
Headwater 7Q10 Flow:	2 MGD (Net; includes Withdrawals/Discharges)
Withdrawal/Discharges:	-0.305 MGD
Incremental Flow in Segments:	5.791855E-02 MGD/Sq.Mi.

Background Water Quality

Background Temperature:	21 Degrees C
Background cBOD5:	5 mg/l
Background TKN:	0 mg/l
Background D.O.:	7.374367 mg/l

Model Segmentation

Number of Segments:	1
Model Start Elevation:	2355 ft above MSL
Model End Elevation:	2320 ft above MSL

REGIONAL MODELING SYSTEM VERSION 4.0
Model Input File for the Discharge to BLUESTONE RIVER.

Segment Information for Segment 1

Definition Information	
Segment Definition:	A discharge enters.
Discharge Name:	BLUEFIELD WESTSIDE WWTP
VPDES Permit No.:	
Discharger Flow Information	
Flow:	8.1 MGD
cBOD5:	5.6 mg/l
TKN:	5.1 mg/l
D.O.:	6.5 mg/l
Temperature:	25 Degrees C
Geographic Information	
Segment Length:	1.7 miles
Upstream Drainage Area:	39.8 Sq.Mi.
Downstream Drainage Area:	0 Sq.Mi.
Upstream Elevation:	2355 Ft.
Downstream Elevation:	2320 Ft.
Hydraulic Information	
Segment Width:	20 Ft.
Segment Depth:	2.5 Ft.
Segment Velocity:	0.3 Ft./Sec.
Segment Flow:	10.1 MGD
Incremental Flow:	-2.305 MGD (Applied at end of segment.)
Channel Information	
Cross Section:	Rectangular
Character:	Moderately Meandering
Pool and Riffle:	Yes
Percent Pools:	50
Percent Riffles:	50
Pool Depth:	3 Ft.
Riffle Depth:	2 Ft.
Bottom Type:	Small Rock
Sludge:	None
Plants:	None
Algae:	None

"Model Run For C:\ABGDN\FREDWORK\Bluefield Model.mod On 3/10/2006 10:54:13 AM"

"Model is for BLUESTONE RIVER."
"Model starts at the BLUEFIELD WESTSIDE WWTP discharge."

"Background Data"

"7Q10",	"cBOD5",	"TKN",	"DO",	"Temp"
"(mgd)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"deg C"
2,	5,	0,	7.374,	21

"Discharge/Tributary Input Data for Segment 1"

"Flow",	"cBOD5",	"TKN",	"DO",	"Temp"
"(mgd)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"deg C"
8.1,	~~5.6~~,	5.1,	6.5,	25

7.0 mg/l BOD_5 2.1 mg/l NH_3-N

"Hydraulic Information for Segment 1"

"Length",	"Width",	"Depth",	"Velocity"
"(mi)",	"(ft)",	"(ft)",	"(ft/sec)"
1.7,	20,	2.5,	.3

"Initial Mix Values for Segment 1"

"Flow",	"DO",	"cBOD",	"nBOD",	"DOSat",	"Temp"
"(mgd)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"(mg/l)",	"deg C"
10.1,	6.673,	13.703,	7.292,	7.754,	24.20792

"Rate Constants for Segment 1. - (All units Per Day)"

"k1",	"k1@T",	"k2",	"k2@T",	"kn",	"kn@T",	"BD",	"BD@T"
.5,	.607,	12.353,	13.649,	.2,	.276,	0,	0

"Output for Segment 1"
"Segment starts at BLUEFIELD WESTSIDE WWTP"

"Total",	"Segm."			
"Dist.",	"Dist.",	"DO",	"cBOD",	"nBOD"
"(mi)",	"(mi)",	"(mg/l)",	"(mg/l)",	"(mg/l)"
0,	0,	6.673,	13.703,	7.292
.1,	.1,	6.753,	13.535,	7.251
.2,	.2,	6.815,	13.369,	7.21
.3,	.3,	6.864,	13.205,	7.17
.4,	.4,	6.903,	13.043,	7.13
.5,	.5,	6.935,	12.883,	7.09
.6,	.6,	6.961,	12.725,	7.05
.7,	.7,	6.978,	12.569,	7.01
.8,	.8,	6.978,	12.415,	6.971
.9,	.9,	6.978,	12.263,	6.932
1,	1,	6.978,	12.112,	6.893
1.1,	1.1,	6.978,	11.963,	6.854
1.2,	1.2,	6.978,	11.816,	6.816
1.3,	1.3,	6.978,	11.671,	6.778
1.4,	1.4,	6.978,	11.528,	6.74
1.5,	1.5,	6.978,	11.386,	6.702
1.6,	1.6,	6.978,	11.246,	6.664
1.7,	1.7,	6.978,	11.108,	6.627

"END OF FILE"

"***SEASONAL RUN***"
"Wet Season is from January to May."
"Model Run For C:\ABGDN\FREDWORK\Bluefield Model.mod On 3/9/2006 11:26:34 AM"

"Model is for BLUESTONE RIVER."
"Model starts at the BLUEFIELD WESTSIDE WWTP discharge."

"Background Data"
"7Q10", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
4.2862, 5, 0, 8.308, 15

"Discharge/Tributary Input Data for Segment 1"
"Flow", "cBOD5", "TKN", "DO", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
8.1, ~~10,~~ 5.9, 6.5, 20
13 mg/l BOD5 2.9 mg/l NH3-N

"Hydraulic Information for Segment 1"
"Length","Width", "Depth", "Velocity"
"(mi)", "(ft)", "(ft)", "(ft/sec)"
1.7, 20, 4.211396, .227534

"Initial Mix Values for Segment 1"
"Flow", "DO", "cBOD", "nBOD", "DOSat", "Temp"
"(mgd)", "(mg/l)", "(mg/l)", "(mg/l)", "(mg/l)", "deg C"
12.3862, 7.126, 20.674, 8.212, 8.635, 18.26978

"Rate Constants for Segment 1. - (All units Per Day)"
"k1", "k1@T", "k2", "k2@T", "kn", "kn@T", "BD", "BD@T"
.7, .647, 12.353, 11.856, .2, .175, 0, 0

"Output for Segment 1"
"Segment starts at BLUEFIELD WESTSIDE WWTP"
"Total", "Segm."
"Dist.", "Dist.", "DO", "cBOD", "nBOD"
"(mi)", "(mi)", "(mg/l)", "(mg/l)", "(mg/l)"
0, 0, 7.126, 20.674, 8.212
.1, .1, 7.2, 20.318, 8.173
.2, .2, 7.259, 19.968, 8.135
.3, .3, 7.307, 19.624, 8.097
.4, .4, 7.348, 19.286, 8.059
.5, .5, 7.382, 18.954, 8.021
.6, .6, 7.412, 18.628, 7.983
.7, .7, 7.439, 18.307, 7.946
.8, .8, 7.464, 17.992, 7.909
.9, .9, 7.487, 17.682, 7.872
1, 1, 7.508, 17.378, 7.835
1.1, 1.1, 7.528, 17.079, 7.798
1.2, 1.2, 7.547, 16.785, 7.761
1.3, 1.3, 7.565, 16.496, 7.725
1.4, 1.4, 7.583, 16.212, 7.689
1.5, 1.5, 7.6, 15.933, 7.653
1.6, 1.6, 7.617, 15.659, 7.617
1.7, 1.7, 7.633, 15.389, 7.581

"END OF FILE"

ATTACHMENT 4

Whole Effluent Toxicity Analysis

Table 1.
WET Summary Test Results
Bluefield Westside WWTP
VPDES Permit No. VA0025054
03/24/2009 –03/23/2014, Report Due by November 10th each year
Acute NOAEC Screening of 100% or TUa of 1.0
Chronic NOEC Screening Criteria is 55% or TU_c of 1.81

TEST DATE		TEST TYPE/ORGANISM	LC_{50}	NOEC	NOAEC	% Survival in 100% conc.	NOTES	LAB
REC; 09/09/09 08/13-15/09	AN-1	Acute P. promelas	NTD	NA	100	100	Pass	REI Consultants, Inc.
REC; 09/09/09 08/13-15/09	AN-1	Acute C. dubia	NTD	NA	100	100	Pass	REI Consultants, Inc.
REC; 09/09/09 08/11-18/09	AN-1	Chronic P. promelas	>100	100 S 100 G	NA	90	Pass	REI Consultants, Inc.
REC; 09/09/09 08/11-18/09	AN-1	Chronic C. dubia	NTD	100 S 100 R	NA	100	Pass	REI Consultants, Inc.
REC; 09/09/10 08/06-07/10	AN-2	Acute P. promelas	>100	NA	100	100	Pass	REI Consultants, Inc.
REC; 09/09/10 08/06-07/10	AN-2	Acute C. dubia	>100	NA	100	100	Pass	REI Consultants, Inc.
REC; 09/09/10 08/03-10/10	AN-2	Chronic P. promelas	>100	100 S 100 G	NA	100	Pass	REI Consultants, Inc.
REC; 09/09/10 08/03-10/10	AN-2	Chronic C. dubia	>100	100S 100R	NA	90	Pass	REI Consultants, Inc.
REC: 01/10/12 08/18-20/11	AN-3	Acute P. promelas	>100	NA	100	100	Pass	REI Consultants, Inc.
REC; 01/10/12 08/18-20/11	AN-3	Acute C. dubia	>100	NA	100	100	Pass	REI Consultants, Inc.
REC; 01/10/12 08/16-23/11	AN-3	Chronic P. promelas	>100	100 S 100 G	NA	90	Pass	REI Consultants, Inc.

TEST DATE		TEST TYPE/ORGANISM	LC_{50}	NOEC	NOAEC	% Survival in 100% conc.	NOTES	LAB
REC; 01/10/12 08/16-23/11		Chronic C. dubia	>100	100 S 100 R	NA	100	Pass	REI Consultants, Inc.
REC: 10/11/12 08/23-25/12	AN-4	Acute P. promelas	>100	NA	100	100	Pass	REI Consultants, Inc.
REC: 10/11/12 08/23-25/12	AN-4	Acute C. dubia	>100	NA	100	100	Pass	REI Consultants, Inc.
REC: 10/11/12 08/21-27/12	AN-4	Chronic P. promelas	>100	100 S 100 G	NA	95	Pass	REI Consultants, Inc.
REC; 10/11/12 08/21-27/12	AN-4	Chronic C. dubia	>100	100 S 100R	NA	100	Pass	REI Consultants, Inc.
REC: 07/12/13 05/23-25/13	AN-5	Acute P. promelas	>100	NA	100	100	Pass	REI Consultants, Inc.
REC: 07/12/13 05/23-25/13	AN-5	Acute C. dubia	>100	NA	100	100	Pass	REI Consultants, Inc.
REC: 07/12/13 05/21-28/13	AN-5	Chronic P. promelas	>100	100 S 100 G	NA	92.5	Pass	REI Consultants, Inc.
REC; 07/12/13 05/21-27/13	AN-5	Chronic C. dubia	>100	100 S 100R	NA	100	Pass	REI Consultants, Inc.

%Survival is the percent survival in 100% effluent at the end of the test period.
All samples are 24 hour flow proportional composites.

ABBREVIATIONS:
AN = Annual tests
R = Reproduction
G = Growth
S = Survival
NTD = No Toxicity Demonstrated

Spreadsheet for determination of WET test endpoints or WET limits

Excel 97
Revision Date: 01/10/05
File: WETLIM10.xls
(MIX.EXE required also)

Acute Endpoint/Permit Limit			Use as LC_{50} in Special Condition, as TUa on DMR				
ACUTE	100% =	NOAEC	LC_{50} =	NA	% Use as	NA	TUa
ACUTE WLAa		0.30851852	Note: Inform the permittee that if the mean of the data exceeds				
			this TUa:	1.0	a limit may result using WLA.EXE		

Chronic Endpoint/Permit Limit			Use as NOEC in Special Condition, as TUc on DMR				
CHRONIC	1.823704236	TU_c	NOEC =	55	% Use as	1.81	TU_c
BOTH*	3.085185261	TU_c	NOEC =	33	% Use as	3.03	TU_c
AML	1.823704236	TU_c	NOEC =	55	% Use as	1.81	TU_c
ACUTE WLAa,c		3.08518519		Note: Inform the permittee that if the mean			
CHRONIC WLAc		1.24691358		of the data exceeds this TUc:			1.0
* Both means acute expressed as chronic				a limit may result using WLA.EXE			

Enter data in the cells with blue type:

Entry Date:	03/14/06				
Facility Name:	Bluefield Westside WWTP				
VPDES Number:	VA0025054				
Outfall Number:	1				
			% Flow to be used from MIX.EXE	Diffuser /modeling study?	
Plant Flow:	8.1	MGD		Enter Y/N	N
Acute 1Q10:	1	MGD	23 %	Acute	1 :1
Chronic 7Q10:	2	MGD	100 %	Chronic	1 :1

Are data available to calculate CV? (Y/N)	N	(Minimum of 10 data points, same species, needed)	Go to Page 2
Are data available to calculate ACR? (Y/N)	N	(NOEC<LC50, do not use greater/less than data)	Go to Page 3

IWC_a	97.23889556	%	Plant flow/plant flow + 1Q10
IWC_c	80.1980198	%	Plant flow/plant flow + 7Q10
Dilution, acute	1.028395062		100/IWCa
Dilution, chronic	1.24691358		100/IWCc

NOTE: If the IWCa is >33%, specify the NOAEC = 100% test/endpoint for use

WLA_a	0.308518518	Instream criterion (0.3 TUa) X's Dilution, acute
WLA_c	1.24691358	Instream criterion (1.0 TUc) X's Dilution, chronic
$WLA_{a,c}$	3.085185185	ACR X's WLA_a - converts acute WLA to chronic units

ACR -acute/chronic ratio		10	LC50/NOEC (Default is 10 - if data are available, use tables Page 3)
CV-Coefficient of variation		0.6	Default of 0.6 - if data are available, use tables Page 2)
Constants	eA	0.4109447	Default = 0.41
	eB	0.6010373	Default = 0.60
	eC	2.4334175	Default = 2.43
	eD	2.4334175	Default = 2.43 (1 samp) No. of sample 1

**The Maximum Daily Limit is calculated from the lowest LTA X's eC. The LTAa,c and MDL using it are driven by the ACR.

$LTA_{a,c}$	1.2678405	WLAa,c X's eA						
LTA_c	0.749441572	WLAc X's eB				Rounded NOEC's		%
MDL** with $LTA_{a,c}$	3.085185261	TU_c	NOEC =	32.412964	(Protects from acute/chronic toxicity)	NOEC =	33	%
MDL** with LTA_c	1.823704236	TU_c	NOEC =	54.833453	(Protects from chronic toxicity)	NOEC =	55	%
AML with lowest LTA	1.823704236	TU_c	NOEC =	54.833453	Lowest LTA X's eD	NOEC =	55	

IF ONLY ACUTE ENDPOINT/LIMIT IS NEEDED, CONVERT MDL FROM TU_c to TU_a

							Rounded LC50's		%
MDL with $LTA_{a,c}$	0.308518526	TU_a	LC50 =	324.129644	%	Use NOAEC=100%	LC50 =	NA	%
MDL with LTA_c	0.182370424	TU_a	LC50 =	548.334527	%	Use NOAEC=100%	LC50 =	NA	

ATTACHMENT 5

Metals Specific Target Values for Water Criteria Monitoring

		HARDNESS	100.00
ACUTE	COPPER ug/l	WQSACUTE	13.4
CHRONIC		WQSCHRONIC	9.0

		HARDNESS	100.00
ACUTE	LEAD ug/l		118.91
CHRONIC		WQSCHRONIC	13.51

		HARDNESS	100.00
ACUTE	ZINC ug/l	WQSACUTE	119.82
CHRONIC		WQSCHRONIC	119.82

		HARDNESS	100.00
ACUTE	CADMIUM ug/l	WQSACUTE	3.92
CHRONIC		WQSCHRONIC	1.13

		HARDNESS	100.00
ACUTE	CHROMIUM III ug/l	WQSACUTE	569.76
CHRONIC		WQSCHRONIC	74.11

		HARDNESS	100.00
ACUTE	NICKEL ug/l	WQSACUTE	182.36
CHRONIC		WQSCHRONIC	20.27

		HARDNESS	100.00
ACUTE	SIVER ug/l	WQSACUTE	3.45

Bluefield Westside WWTP
Metals Calculations for Attachment A

WLA formula = chronic standard (7Q10 + effluent flow) / effluent flow

Antimony: WLA = 640 (2.0 + 8.1) / 8.1 ug/l = ~~798~~ 500 ug/l

Arsenic: WLA = 150 (2.0 + 8.1) / 8.1 ug/l = ~~187~~ 150 ug/l

Cadmium: WLA = 1.13 (2.0 + 8.1) / 8.1 ug/l = 1.4 ug/l

Chromium III: WLA = 74.11 (2.0 + 8.1) / 8.1 ug/l = ~~9.2~~ 9 ug/l

Chromium VI: WLA = 11 (2.0 + 8.1) / 8.1 ug/l = 14 ug/l

Copper: WLA = 9.0 (2.0 + 8.1) / 8.1 ug/l = 11 ug/l

Lead: WLA = 13.51 (2.0 + 8.1) / 8.1 ug/l = 17 ug/l

Mercury: WLA = 0.77 (2.0 + 8.1) / 8.1 ug/l = ~~0.96~~ 0.9 ug/l

Selenium: WLA = 5.0 (2.0 + 8.1) / 8.1 ug/l = 6 ug/l

acute
Silver: WLA = 3.45 (1.0 + 8.1) / 8.1 ug/l = 3.9 ug/l

Zinc: WLA = 119.82 (2.0 + 8.1) / 8.1 ug/l = ~~149~~ 100 ug/l

Nickel: WLA = 20.27 (2.0 + 8.1) / 8.1 ug/l = 25 ug/l

ATTACHMENT 6

303 (d) Fact Sheets

TMDL

New River Basin

Cause Group Code: **N36R-01-BAC** **Bluestone River and Big Branch**

Location: N36R-01-BAC

City / County: Tazewell Co.

Use(s): Recreation

Cause(s) / VA Category: Escherichia coli / 4A Fecal Coliform / 4A

Station 9-BST066.80 had a 60% exceedence of the E.coli water quality standard. The AWQM station located at 9-BST062.47 had a 77% exceedence of the E.coli water quality standard, station 9-BST073.32 had a 37% exceedence and station 9-BIG000.12 had a 88% ex

Assessment Unit / Water Name / Description	Cause Category	Name	Cycle First Listed	TMDL Schedule	Size
VAS-N36R_BST04A02 / Bluestone River / From Wright's Valley Creek confluence downstream to N37 at the Big Branch confluence, section 1g, u.	4A	Escherichia coli	2004		6.05
VAS-N36R_BST04B02 / Bluestone River / From PWS intake for Town of Bluefield, downstream to Wright's Valley Creek confluence, section 1g, u.	4A	Escherichia coli	2006		1.63
VAS-N36R_BST05A02 / Bluestone River / From Town of Bluefield PWS intake, upstream to Rt 460 bridge, WQS Section 1h, u.	4A	Escherichia coli	2006		4.93
VAS-N37R_BIG01A10 / Big Branch / Bluestone tributary south of Abbs Valley Ridge, from headwaters in WQS Section 1g, parallel SR 698.	4A	Escherichia coli	2010		3.25
VAS-N37R_BST01A96 / Bluestone River / Mainstem from Big Branch confluence downstream to WV state line near Yards in WQS Section 1g, u.	4A	Escherichia coli	2006		0.59

Bluestone River and Big Branch	Reservoir (Acres)	River (Miles)
Escherichia coli - Total Impaired Size by Water Type:		16.45

Assessment Unit / Water Name / Description	Cause Category	Name	Cycle First Listed	TMDL Schedule	Size
VAS-N36R_BST04B02 / Bluestone River / From PWS intake for Town of Bluefield, downstream to Wright's Valley Creek confluence, section 1g, u.	4A	Fecal Coliform	2002		1.63
VAS-N37R_BST01A96 / Bluestone River / Mainstem from Big Branch confluence downstream to WV state line near Yards in WQS Section 1g, u.	4A	Fecal Coliform	2002		0.59

New River Basin

Bluestone River and Big Branch

	Reservoir (Acres)	River (Miles)
Fecal Coliform - Total Impaired Size by Water Type:		2.22

Sources:

Rural (Residential Areas) | Sewage Discharges in Unsewered Areas | Source Unknown

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY

2012 Impaired Waters

Categories 4 and 5

New River Basin

Cause Group Code: **N36R-01-BEN** **Bluestone River**

Location: N36R-01-BEN

City / County: Tazewell Co.

Use(s): Aquatic Life

Cause(s) / VA Category: Benthic-Macroinvertebrate Bioassessments / 4A   Sedimentation/Siltatic

Biological station 9-BST066.80 was impaired based on the VSCI scores of 26 and 31 in 2008.

Assessment Unit / Water Name / Description	Cause Category / Name		Cycle First Listed	TMDL Schedule	Size
VAS-N36R_BST04A02 / Bluestone River / From Wright's Valley Creek confluence downstream to N37 at the Big Branch confluence, section 1g, u.	4A	Benthic-Macroinvertebrate Bioassessments	2002		6.05
VAS-N37R_BST01A96 / Bluestone River / Mainstem from Big Branch confluence downstream to WV state line near Yards in WQS Section 1g, u.	4A	Benthic-Macroinvertebrate Bioassessments	2002		0.59

Bluestone River	Reservoir (Acres)	River (Miles)
Benthic-Macroinvertebrate Bioassessments - Total Impaired Size by Water Type:		6.64

Assessment Unit / Water Name / Description	Cause Category / Name		Cycle First Listed	TMDL Schedule	Size
VAS-N36R_BST04A02 / Bluestone River / From Wright's Valley Creek confluence downstream to N37 at the Big Branch confluence, section 1g, u.	4A	Sedimentation/Siltation	2010		6.05
VAS-N37R_BST01A96 / Bluestone River / Mainstem from Big Branch confluence downstream to WV state line near Yards in WQS Section 1g, u.	4A	Sedimentation/Siltation	2010		0.59

Bluestone River	Reservoir (Acres)	River (Miles)
Sedimentation/Siltation - Total Impaired Size by Water Type:		6.64

Sources:

- Crop Production (Crop Land or Dry Land)
- Silviculture Activities
- Unrestricted Cattle Access

New River Basin

Cause Group Code: **N36R-01-PCB** **Bluestone River**

Location: N36R-01-PCB

City / County: Tazewell Co.

Use(s): Fish Consumption

Cause(s) / VA Category: PCB in Fish Tissue / 5A PCB in Water Column

In April 2004 a Special Study was conducted by DEQ and USGS. An SPMD deployed at station 9-BPB000.02 indicated Total PCBs in the water column at 3700pg/l and 1300pg/l in 2005. SPMDs deployed at stations 9-BST0066.18, 9-BST0068.98 and 9-BST0072.65 indicat

Assessment Unit / Water Name / Description	Cause Category / Name		Cycle First Listed	TMDL Schedule	Size
VAS-N36R_BST04A02 / Bluestone River / From Wright's Valley Creek confluence downstream to N37 at the Big Branch confluence, section 1g, u.	5A	PCB in Fish Tissue	2002	2012	6.05
VAS-N36R_BST04B02 / Bluestone River / From PWS intake for Town of Bluefield, downstream to Wright's Valley Creek confluence, section 1g, u.	5A	PCB in Fish Tissue	2002	2012	1.63
VAS-N36R_BST05A02 / Bluestone River / From Town of Bluefield PWS intake, upstream to Rt 460 bridge, WQS Section 1h, u.	5A	PCB in Fish Tissue	2002	2012	4.93
VAS-N37R_BST01A96 / Bluestone River / Mainstem from Big Branch confluence downstream to WV state line near Yards in WQS Section 1g, u.	5A	PCB in Fish Tissue	2002	2012	0.59

Bluestone River	Reservoir (Acres)	River (Miles)
PCB in Fish Tissue - Total Impaired Size by Water Type:		13.20

Assessment Unit / Water Name / Description	Cause Category / Name		Cycle First Listed	TMDL Schedule	Size
VAS-N36R_BFK01A06 / Brush Fork / Bluestone tributary from WV state line downstream to Bluestone River at Falls Mills parallel to SR 643, WQS Section 1g.	5A	PCB in Water Column	2010	2022	1.36
VAS-N36R_BPB01A06 / Beaverpond Creek / Bluestone tributary from WV state line, sometimes under town buildings and streets, downstream to Bluestone confluence, WQS Section 1g.	5A	PCB in Water Column	2012	2018	3.03

Bluestone River	Reservoir (Acres)	River (Miles)
PCB in Water Column - Total Impaired Size by Water Type:		4.39

New River Basin

Sources:

Inappropriate Waste Disposal	Source Unknown

New River Basin

Cause Group Code: **N36R-01-CDANE Bluestone River**

Location: N36R-01-CDANE

City / County: Tazewell Co.

Use(s): Fish Consumption

Cause(s) / VA Category: Chlordane / 5A

The fish tissue and sediment sampling stations at 9-BST069.46 and 9-BST066.94 had total chlordane levels detected in the sediment in 2002 above DEQ's screening value.

Assessment Unit / Water Name / Description	Cause Category / Name		Cycle First Listed	TMDL Schedule	Size
VAS-N37R_BST01A96 / Bluestone River / Mainstem from Big Branch confluence downstream to WV state line near Yards in WQS Section 1g, u.	5A	Chlordane	2004	2016	0.59

Bluestone River	Reservoir (Acres)	River (Miles)
Chlordane - Total Impaired Size by Water Type:		0.59

Sources:

Source Unknown

EXECUTIVE SUMMARY

Background and Applicable Standards

Bluestone River was placed on the Commonwealth of Virginia's 1996 Section 303(d) TMDL Priority List because of violations of the fecal coliform bacteria water quality standard, and the General Standard (benthic). The focus of this TMDL is on the fecal coliform and benthic impairments in Bluestone River. Based on exceedances of the standard recorded at Virginia Department of Environmental Quality (VADEQ) monitoring stations, the stream does not support primary contact recreation (*e.g.*, swimming, wading, and fishing). The new applicable state standard (Virginia Water Quality Standard 9 VAC 25-260-170) specifies that the number of fecal coliform bacteria shall not exceed a maximum allowable level of 400 colony-forming units (cfu) per 100 milliliters (ml). Alternatively, if data is available, the geometric mean of two or more observations taken in a calendar month should not exceed 200-cfu/100 ml. A review of available monitoring data for the watershed indicated that fecal coliform bacteria were consistently elevated above the 400-cfu/100 ml standard. EPA directed that the state develop a water quality standard for *E. coli* bacteria to eventually replace the fecal coliform standard. This new standard specifies that the number of *E. coli* bacteria shall not exceed a maximum allowable level of 235-cfu /100 ml (Virginia Water Quality Standard 9 VAC 25-260-170). During the development of this TMDL, 58% of samples analyzed for the presence *E. coli* exceeded the 235-cfu/100 ml standard. In addition, if data is available, the geometric mean of two or more observations taken in a calendar month should not exceed 126-cfu/100 ml.

The General Standard is implemented by VADEQ through application of the Rapid Bioassessment Protocol II (RBP). Using the RBP, the health of the benthic macro-invertebrate community is typically assessed through measurement of 8 biometrics that evaluate different aspects of the community's overall health. Surveys of the benthic macroinvertebrate community performed by VADEQ are assessed at the family taxonomic level. Each biometric measured at a target station is compared to the same biometric measured at a reference (non-impaired) station to determine each biometric score. These scores are then summed and used to determine the overall bioassessment (*e.g.*, non-impaired, moderately impaired, or severely impaired). Using this methodology, Bluestone River was rated as moderately impaired.

TMDL Endpoint and Water Quality Assessment

Fecal Coliform

Potential sources of fecal coliform include both point source and nonpoint source contributions. Nonpoint sources include: grazing livestock, land application of manure, land application of biosolids, urban/suburban runoff, failed and malfunctioning septic systems, uncontrolled discharges (straight pipes, dairy parlor waste, etc.), and wildlife. There are nine National Pollutant Discharge Elimination System (NPDES) permitted discharges in the Bluestone River watershed. Two municipal wastewater treatment plants are permitted for fecal coliform bacteria discharge.

Fecal bacteria TMDLs in the Commonwealth of Virginia are developed using the *E. coli* standard. For this TMDL development, the in-stream *E. coli* target was a geometric mean not exceeding 126-cfu/100 ml and a single sample maximum of 235-cfu/100 ml. A translator developed by VADEQ was used to convert fecal coliform values to *E. coli* values.

General Standard (benthic)

TMDLs must be developed for a specific pollutant(s). Benthic assessments are very good at determining if a particular stream segment is impaired or not but generally do not provide enough information to determine the cause(s) of the impairment. Therefore, the first step in the development of a Benthic TMDL, known as a stressor identification, is to determine the cause of the impairment. The process outlined in the Stressor Identification Guidance Document (EPA, 2000) was used to systematically identify the most probable stressor(s) for Bluestone River. A list of candidate causes was developed from published literature and VADEQ staff input. Chemical and physical monitoring data from ambient monitoring stations 9-BST023.05 and 9-BST029.57 provided evidence to support or eliminate potential stressors. Individual metrics for the biological and habitat evaluation were used to determine if there were links to a specific stressor(s). Landuse data as well as a visual assessment of conditions along the stream provided additional information to eliminate or support candidate stressors. The potential stressors are: sediment, toxics, low dissolved oxygen, nutrients, pH, metals, conductivity, temperature and organic matter.

The results of the stressor analysis for Bluestone River were divided into three categories:

> **Non-Stressor**: Those stressors with data indicating normal conditions, without water quality standard violations, or without the observable impacts usually associated with a specific stressor, were eliminated as possible stressors.
>
> **Possible Stressor**: Those stressors with data indicating possible links, but inconclusive data, were considered to be possible stressors.
>
> **Most Probable Stressor**: The stressor(s) with the most consistent information linking it with the poorer benthic and habitat metrics was considered to be the most probable stressor(s).

The results indicate that sediment is the most probable stressor on the benthic community. VADEQ staff at the Southwest Regional Office noted that, upstream of the Town of Bluefield, the streambanks had very poor structure due to livestock access to the stream. In addition, Dill Spring has significant sediment deposits in the vicinity of Bluefield's raw water intake. Urban runoff, construction activity, and agricultural activity are the most likely sources. Based on the analyses, sediment was the target pollutant used to address the benthic impairment in the Bluestone River.

Sediment is delivered to the Bluestone River watershed through surface runoff (rural and urban areas), streambank erosion, point sources, and natural erosive processes. The sediment process is a natural and continual process that is often accelerated by human activity. During runoff events (natural rainfall or irrigation), sediment is transported to streams from land areas (*e.g.*, agricultural fields, lawns, forest, etc.). Rainfall energy, soil cover, soil characteristics, topography, and land management affect the magnitude of sediment loading. Agricultural management activities such as overgrazing (particularly on steep slopes), high tillage operations, livestock concentrations (*e.g.*, along stream edge, uncontrolled access to streams, etc.), forest harvesting, construction (roads, buildings, etc.) all tend to accelerate erosion at varying degrees. During dry periods, sediment from air or traffic builds up on impervious areas and is transported to streams during runoff events.

An increase in impervious land without appropriate stormwater control increases runoff volume and peaks, which leads to greater potential for channel erosion. It has been well documented that livestock with access to streams can significantly alter physical dimensions of streams through trampling and shearing (Armour et al., 1991; Clary and Webster, 1990; Kaufman and Kruger, 1984). Increasing the bank full width decreases stream depth, increases sediment, and adversely affects aquatic habitat (USDI, 1998).

Fine sediments are included in total suspended solids (TSS) loads that are permitted for wastewater, industrial stormwater, and construction stormwater discharge. There are two permits for wastewater/sewage treatment plants, two industrial stormwater discharge permits, and five industrial wastewater discharge permits located within the watershed.

Water Quality Modeling

Fecal Coliform

The U.S. Geological Survey (USGS) Hydrologic Simulation Program - Fortran (HSPF) water quality model was selected as the modeling framework to simulate existing conditions and perform TMDL allocations. In establishing the existing and allocation conditions, seasonal variations in hydrology, climatic conditions, and watershed activities were explicitly accounted for in the model. Mean daily discharge at USGS Gaging Station #03177710 (Bluestone River at Falls Mills, Virginia) and precipitation at Wytheville station #449301 were available from October 1980 to April 1997. The modeling period was selected to include the VADEQ assessment period from July 1992 through June 1997 that led to the inclusion of the Bluestone River segment on the 1996 Section 303 (d) list.

The time periods covered by calibration and validation represent a broad range of hydrologic and climatic conditions and are representative of the long-term precipitation and discharge record. For purposes of modeling watershed inputs to in-stream water quality, the Bluestone River drainage area was divided into nine subwatersheds. The model was calibrated for water quality predictions using data collected at VADEQ monitoring stations over the period October 1981 through September 1985 and validated using data collected between October 1986 and September 1990. The hydrologic model performed well when compared to the observed flow, with a percent difference (or error) between observed and modeled data for total in-stream flows, -2.9%, upper 10% flows, -9.3%, and lower 50% flows, 2.2%. The water quality calibration was conducted using monitored data from October 1993 through September 1998. Modeled coliform levels matched observed levels during a variety of flow conditions, indicating that the model was well calibrated.

General Standard (benthic) - Sediment

There is no in-stream criteria for sediment in Virginia; therefore, a reference watershed approach was used to define allowable TMDL loading rates in the Bluestone River watershed. This approach pairs two watersheds: one that is supportive of its designated use(s) and one whose streams are impaired. The Dry River watershed was selected as the TMDL reference for Bluestone River. The TMDL sediment load was defined as the modeled sediment load for existing conditions from the non-impaired Dry River watershed, area-adjusted to the Bluestone River watershed. The Generalized Watershed Loading Function (GWLF) model (Haith et al., 1992) was used for comparative modeling for both Bluestone River and Dry River. The model for Bluestone River was calibrated using the mean daily flow from USGS Station #03177700 for the period January 1972 through December 1979, and daily precipitation and temperature data from Wytheville 1S, station #449301. The model was initially parameterized with recommended model parameters for the landuses and conditions in the Bluestone River watershed. The reference watershed (Dry River) did not have an observed streamflow station located within the watershed boundary. The model for Dry River was calibrated using streamflow data from nearby downstream USGS Station #01622000 for the period

ATTACHMENT 7

T & E Species

Wyatt, Frederick (DEQ)

From:	Aschenbach, Ernie (DGIF)
Sent:	Thursday, January 23, 2014 1:46 PM
To:	Wyatt, Frederick (DEQ); Hillman, Brett; nhreview (DCR)
Cc:	ProjectReview (DGIF); Cason, Gladys (DGIF)
Subject:	ESSLog 25879; VPDES reissuance VA0025054 Bluefield Westside WWTP in Bluefield, VA

We have reviewed the application for VPDES reissuance for the above-referenced facility. The receiving water is Bluestone River with a high-flow 7Q10 of 2.0 million gallons per day (MGD). The facility has a daily (Design Flow) flow of 8.1 MGD. Total residual chlorine is 0.010 mg/l monthly average and 0.012 mg/l weekly average. Total Ammonia (as Nitrogen) is 2.1 mg/l monthly average and 2.8 mg/l weekly average.

According to our records, Bluestone River is a designated Threatened and Endangered (T&E) species water for the state Endangered (SE) Tennessee heelsplitter. In general, when water is treated we typically recommend and support ultraviolet (UV) disinfection (rather than chlorination disinfection), if practicable. If chlorination becomes necessary and is used, we recommend dechlorination, prior to discharge. The ammonia limits proposed within the EPA rule are the best information currently available regarding ammonia levels protective of mussels (not T&E mussels, <u>any</u> mussel species). Therefore, we recommend the EPA values being implemented in this permit for this and all future VPDES permits, if practicable.

This project is located within 2 miles of a documented occurrence of a state or federal threatened or endangered plant or insect species and/or other Natural Heritage coordination species. Therefore, we recommend and support coordination with VDCR-DNH regarding the protection of these resources. We also recommend contacting the USFWS regarding all federally listed species.

Thank you for the opportunity to provide comments. Please call me if you have any questions.

Ernie Aschenbach
Environmental Services Biologist
Virginia Dept. of Game and Inland Fisheries
P.O. Box 11104
4010 West Broad Street
Richmond, VA 23230
Phone: (804) 367-2733
FAX: (804) 367-2427
Email: Ernie.Aschenbach@dgif.virginia.gov

Wyatt, Frederick (DEQ)

From: Hillman, Brett [brett_hillman@fws.gov]
Sent: Tuesday, December 17, 2013 9:14 AM
To: Wyatt, Frederick (DEQ)
Cc: Cindy Schulz; Susan Lingenfelser; Hypes, Rene (DCR); Aschenbach, Ernie (DGIF); Watson, Brian (DGIF)
Subject: VA0025054 - Bluefield Westside Wastewater Treatment Plant

Dear Mr. Wyatt:

We have reviewed the above referenced project description. The following comments are provided under provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended, and the Clean Water Act (33 U.S.C. 1251-1375, 86 Stat. 816).

Based on the project description and location, it appears that no impacts to federally listed species or designated critical habitat will occur, and we have no further comment. Should project plans change or if additional information on the distribution of listed species or critical habitat becomes available, this determination may be reconsidered. If you have any questions, please contact me at 804-693-6694 ext. 156, or via email at brett_hillman@fws.gov.

Best,
Brett

Brett Hillman
Fish and Wildlife Biologist
U.S. Fish & Wildlife Service
Virginia Field Office
6669 Short Lane
Gloucester, VA 23061

Phone: 804-693-6694 ext. 156
Fax: 804-693-9032
Email: brett_hillman@fws.gov

Wyatt, Frederick (DEQ)

From:	Wyatt, Frederick (DEQ)
Sent:	Monday, December 16, 2013 1:33 PM
To:	Cason, Gladys (DGIF); 'Susan_Lingenfelser@fws.gov'
Subject:	T&E Coordination, Reissuance of VPDES Permit No. VA0025054 for Bluefield Westside Wastewater Treatment Plant
Attachments:	doc04332320131216114941.pdf

Attached is the T&E Coordination Package for your review.

Fred M. Wyatt
Virginia Department of Environmental Quality
Southwest Regional Office
355-A Deadmore Street
Abingdon, VA 24210
Phone: (276) 676-4810
E-mail: frederick.wyatt@deq.virginia.gov

VIRGINIA DEPARTMENT OF ENVIRONMENTAL QUALITY	**VPDES PERMITS** **Threatened and Endangered Species Coordination**
To: (X) DGIF, Environmental Review Coordinator ( ) DCR (X) USFWS, T/E Review Coordinator **From: Fred M. Wyatt** **DEQ, Southwest Regional Office** **P.O. Box 1688** **Abingdon, VA 24212-1688** **frederick.wyatt@deq.virginia.gov**	**Date Sent: 12/10/2013** **Permit Number: VA0025054**
Facility Name: Bluefield Westside WWTP **Contact: Shannon Bailey, Executive Director** **Phone: (304) 325-3681** **Address: The Sanitary Board of Bluefield** **P.O. Box 998** **Bluefield, WV 24701**	**Location: State Route 102, 203 Parsley Street, Bluefield, VA** **USGS Quadrangle: Bramwell, VA** **Latitude/Longitude: 37°15'39"/81°16'55"** **Receiving Stream: Bluestone River** **Receiving Stream Flow Statistics used for Permit: 1Q10 Flow = 1.0 MGD** **7Q10 Flow = 2.0 MGD** **30Q10 Flow = 1.7 MGD** **Topo Map Attached**
Effluent Characteristics and Max Daily Flow: See attached draft permit pages	**Species Search Results (or attach database report and map):** **See attached DGIF list.**

Attach draft permit effluent limits page if available or attach existing effluent limits page (make sure it is clear in your email which one it is – draft current or existing).

DGIF email: Gladys.Cason@dgif.virginia.gov USFWS email: Susan_Lingenfelser@fws.gov
DCR: If Natural Heritage Data Explorer (NHDE) has the needed information DCR does not need this form. If you have additional information you wish to add, you may do so in the comments field on the NHDE form. DCR will contact you directly if they need more information.

VaFWIS Initial Project Assessment Report Compiled on 10/23/2013, 7:26:49 AM

Help

Known or likely to occur within a **2 mile radius around point 37,15,39.0 -81,16,55.0** in **185 Tazewell County, VA**

View Map of Site Location

438 Known or Likely Species ordered by Status Concern for Conservation (displaying first 39) (39 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
050023	FESE	I	Bat, Indiana	Myotis sodalis		BOVA
060169	FESE	I	Bean (pearlymussel), Cumberland	Villosa trabalis		BOVA
060031	FESE	I	Mussel, oyster	Epioblasma capsaeformis		BOVA
060082	FESE	I	Pearlymussel, cracking	Hemistena lata		BOVA
060094	FESE	I	Pearlymussel, littlewing	Pegias fabula		BOVA
060051	FESE	I	Pigtoe, finerayed	Fusconaia cuneolus		BOVA
060052	FESE	I	Pigtoe, shiny	Fusconaia cor		BOVA
060122	FESE	I	Rabbitsfoot, rough	Quadrula cylindrica strigillata		BOVA
050035	FESE	II	Bat, Virginia big-eared	Corynorhinus townsendii virginianus		BOVA
040267	SE	I	Wren, Bewick's	Thryomanes bewickii		BOVA
060080	SE	II	Heelsplitter, Tennessee	Lasmigona holstonia	Yes	BOVA,TEWaters,Habitat,SppObs
040096	ST	I	Falcon, peregrine	Falco peregrinus		BOVA
040293	ST	I	Shrike, loggerhead	Lanius ludovicianus		BOVA
010342	ST	II	Darter, sickle	Percina williamsi		BOVA
060163	ST	IV	Papershell, fragile	Leptodea fragilis		BOVA
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans		BOVA
060121	FP	II	Kidneyshell, fluted	Ptychobranchus subtentum		BOVA
080214	FS	I	Stonefly, Beartown perlodid	Isoperla major		BOVA

080226	FS	I	Stonefly, Kosztarab's common	Acroneuria kosztarabi		BOVA
100248	FS	I	Fritillary, regal	Speyeria idalia idalia		BOVA
010341	FS	II	Logperch, blotchside	Percina burtoni		BOVA
040093	FS	II	Eagle, bald	Haliaeetus leucocephalus		BOVA
060050	FS	II	Pigtoe, Tennessee	Fusconaia barnesiana		BOVA
100154	FS	II	Butterfly, Persius duskywing	Erynnis persius persius		BOVA
010429	FS	III	Sculpin, Bluestone	Cottus sp. 1		BOVA
100001	FS	IV	fritillary, Diana	Speyeria diana		BOVA
020020	CC	II	Hellbender, eastern	Cryptobranchus alleganiensis alleganiensis		BOVA
030012	CC	IV	Rattlesnake, timber	Crotalus horridus		BOVA
040372		I	Crossbill, red	Loxia curvirostra		BOVA
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius		BOVA,Habitat
040319		I	Warbler, black-throated green	Dendroica virens		BOVA
040306		I	Warbler, golden-winged	Vermivora chrysoptera		BOVA
020011		II	Frog, mountain chorus	Pseudacris brachyphona		BOVA,Habitat
020030		II	Salamander, green	Aneides aeneus		BOVA
040052		II	Duck, American black	Anas rubripes		BOVA
040213		II	Owl, northern saw-whet	Aegolius acadicus		BOVA
040320		II	Warbler, cerulean	Dendroica cerulea		BOVA
040304		II	Warbler, Swainson's	Limnothlypis swainsonii		BOVA
040266		II	Wren, winter	Troglodytes troglodytes		BOVA

To view **All 438 species** View 438

* FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; FS=Federal Species of Concern; CC=4 VAC 15-360-10 section 5 Collection Concern

** I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need

Bat Colonies or Hibernacula: **Not K... n**

Anadromous Fish Use Streams

N/A

Colonial Water Bird Survey

N/A

Threatened and Endangered Waters (1 Reach)

View Map of All Threatened and Endangered Waters

Stream Name	T&E Waters Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Bluestone River (05050002)	SE	060080	SE	II	Heelsplitter, Tennessee	Lasmigona holstonia	Yes

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests

N/A

Habitat Predicted for Aquatic WAP Tier I & II Species (3 Reaches)

View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

Stream Name	Tier Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
(50500021)	SE	060080	SE	II	Heelsplitter, Tennessee	Lasmigona holstonia	Yes
Bluestone River (50500021)	SE	060080	SE	II	Heelsplitter, Tennessee	Lasmigona holstonia	Yes

Mud Fork (50500021)	SE	060080	SE	II	Heelsplitter, Tennessee	Lasmigona holstonia	Yes

Habitat Predicted for Terrestrial WAP Tier I & II Species (2 Species)

View Map of Combined Terrestrial Habitat Predicted for 2 WAP Tier I & II Species Listed Below

ordered by Status Concern for Conservation

BOVA Code	Status*	Tier**	Common Name	Scientific Name	View Map
040225		I	Sapsucker, yellow-bellied	Sphyrapicus varius	Yes
020011		II	Frog, mountain chorus	Pseudacris brachyphona	Yes

Public Holdings:

N/A

Compiled on 10/23/2013, 7:26:49 AM 1495363.0 report=IPA searchType= R dist= 3218 poi= 37,15,39.0 -81,16,55.0

PixelSize=64; Anadromous=0.065763; BECAR=0.069057; Bats=0.056003; Buffer=0.222927; County=0.370879; Impediments=0.059079; Init=0.316487; PublicLands=0.070183; SppObs=1.457118; TEWaters=0.09869; TierReaches=0.398898; TierTerrestrial=0.159408; Total=3.168627; Trout=0.044939

Wyatt, Frederick (DEQ)

From: nhreview (DCR)
Sent: Thursday, November 14, 2013 6:36 PM
To: Wyatt, Frederick (DEQ)
Cc: ProjectReview (DGIF)
Subject: VA0025054, Bluefiled Westside WWTP
Attachments: 65658, DEQ VA0025054, Bluefield Westside WWTP.pdf

Mr. Wyatt,

Please find attached the DCR-DNH comments for the above referenced project. The comments are in pdf format and can be printed for your records. Also species rank information is available at http://www.dcr.virginia.gov/natural_heritage/help.shtml for your reference.

Thank you for the opportunity to comment on this project.

S. Rene' Hypes
Project Review Coordinator
Department of Conservation and Recreation
Division of Natural Heritage
600 East Main Street, 24th Floor
Richmond, Virginia 23219
804-371-2708 (phone)
804-371-2674 (fax)
rene.hypes@dcr.virginia.gov

VIRGINIA NATURAL HERITAGE PROGRAM

Conserving VA's Biodiversity through Inventory, Protection and Stewardship
www.dcr.virginia.gov/natural_heritage
Virginia Natural Heritage Program on Facebook

Douglas W. Domenech
Secretary of Natural Resources

David A. Johnson
Director

COMMONWEALTH *of* VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

600 East Main Street, 24th Floor
Richmond, Virginia 23219
(804) 786-6124

November 14, 2013

Fred Wyatt
DEQ – Southwest Regional Office
355-A Deadmore Street
Abingdon, VA 24210

Re: VA0025054, Bluefield Westside WWTP

Dear Mr. Wyatt:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in our files, the Bluestone River at Falls Mill Stream Conservation Unit (SCU) is located within the project site. SCUs identify stream reaches that contain aquatic natural heritage resources, including 2 miles upstream and 1 mile downstream of documented occurrences, and all tributaries within this reach. SCUs are also given a biodiversity significance ranking based on the rarity, quality, and number of element occurrences they contain. The Bluestone River at Falls Mill SCU has been given a biodiversity ranking of B4, which represents a site of moderate significance. The natural heritage resource associated with this site is:

Lasmigona holstonia	Tennessee heelsplitter	G3/S1/NL/LE

The Tennessee heelsplitter, a rare freshwater mussel species, occurs in the Ohio and Tennessee River drainages (NatureServe, 2009). In Virginia, there are records from the Powell, Clinch, Holston, and New River drainages. This is a mussel of smaller streams, or side-channels and sloughs of larger streams. It is found in fine particulate substrates (sand and mud) at shallow water depths (NatureServe, 2009). Please note that the Tennessee heelsplitter is currently listed as endangered by the Virginia Department of Game and Inland Fisheries (VDGIF).

Considered good indicators of the health of aquatic ecosystems, freshwater mussels are dependent on good water quality, good physical habitat conditions, and an environment that will support populations of host fish species (Williams et al., 1993). Because mussels are sedentary organisms, they are sensitive to water quality degradation related to increased sedimentation and pollution. They are also sensitive to habitat destruction through dam construction, channelization and dredging, and the invasion of exotic mollusk species.

In addition, Bluestone River has been designated by the VDGIF as a "Threatened and Endangered Species Water." The species associated with this T & E Water is the Tennessee heelsplitter.

To minimize impacts to aquatic resources, DCR recommends the use of uv/ozone to replace chlorination disinfection and utilization of new technologies as they become available to improve water quality. Due to the legal status of the Tennessee heelsplitter, DCR recommends coordination with Virginia's regulatory authority for the management and protection of this species, the VDGIF, to ensure compliance with the Virginia Endangered Species Act (VA ST §§ 29.1-563 – 570).

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

New and updated information is continually added to Biotics. Please contact DCR for an update on this natural heritage information if a significant amount of time passes before it is utilized.

The VDGIF maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Gladys Cason (804-367-0909 or Gladys.Cason@dgif.virginia.gov).

Should you have any questions or concerns, feel free to contact René Hypes at 804-371-2708. Thank you for the opportunity to comment on this project.

Sincerely,

René Hypes

S. René Hypes
Project Review Coordinator

CC: Ernie Aschenbach, VDGIF

Literature Cited

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: April 27, 2010).

Williams, J.D., M.L. Warren, Jr., K.S. Cummings, J.L. Harris, and R.J. Neves. 1993. Conservation status of freshwater mussels of the United States and Canada. Fisheries 18: 6-9.

Wyatt, Frederick (DEQ)

From:	vanhde@natureserve.org
Sent:	Thursday, October 24, 2013 10:28 AM
To:	Wyatt, Frederick (DEQ)
Subject:	Reissuance of VPDES Individual Permit for Bluefield Westside WWTP has completed initial review

Dear Clairise R Shaheen,

An initial review of your project, entitled 'Reissuance of VPDES Individual Permit for Bluefield Westside WWTP', has been completed. The resulting report can be found here. To view the project page, shapefile and any attachments, click here. If natural heritage resources are documented or predicted within the search radius, DCR will provide additional comments via email within thirty calendar days or within 5 business days if priority service was selected. If no natural heritage resources are documented or predicted within the search radius, no further coordination is needed with this office. The report can be saved and/or printed for your files.

Thank you for submitting this project for review.

DCR-VA Natural Heritage Program

DCR
Department of Conservation & Recreation
CONSERVING VIRGINIA'S NATURAL & RECREATIONAL RESOURCES

Web Project ID: WEB0000001141

Client Project Number: VA0025054

PROJECT INFORMATION

TITLE: Reissuance of VPDES Individual Permit for Bluefield Westside WWTP

DESCRIPTION: Reissuance of existing VPDES permit for 8.1 MGD WWTP. No proposed upgrades or expansion is planned for the facility.

EXISTING SITE CONDITIONS: Existing discharge to the Bluestone River at river mile 9-BST069.39 with estimated complete mix at 200 feet.

QUADRANGLES: Bramwell

COUNTIES: Tazewell

Latitude/Longitude (DMS): 37°15'39.7759"N / 81°16'54.2352"W

Acreage: 0 acres

Comments: Complete mix estimated with: 1Q10 Stream Flow of 1.0 MGD, 7Q10 Stream Flow of 2.0 MGD, and 30Q10 Stream Flow of 1.7 MGD.

REQUESTOR INFORMATION

Priority: N   Tier Level: Tier II   Tax ID:

Contact Name: Fred Wyatt

Company Name: Department of Environmental Quality

Address: 355-A Deadmore Street

City: Abingdon   State: VA   Zip: 24210

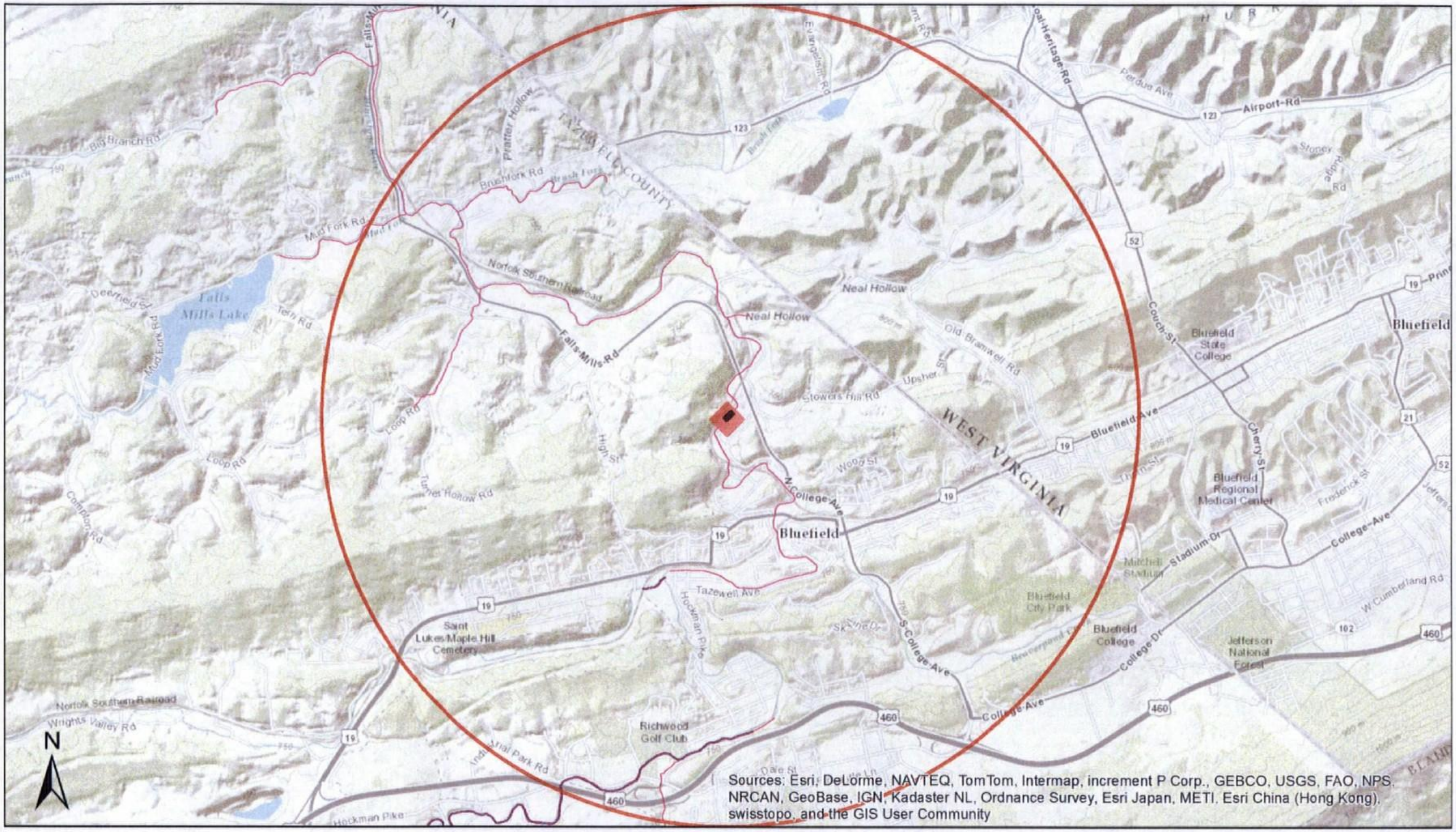
Phone: 276-676-4810 Fax: 276-676-4899 Email: frederick.wyatt@deq.virginia.gov

Conservation Site	Site Type	Brank	Acreage	Listed Species Presence
	SCU	B4	20	SL
	SCU	B4	27	SL
	GLNHR	NA	0	NL
	GLNHR	NA	0	NL
Natural Heritage Screening Features within Search Radius				

Site Name	Group Name	Common Name	Scientific Name	GRANK	SRANK	Fed Status	State Status	EO Rank	Last Obs Date	Preci sion
	Vertebrate Animal	Bluestone Sculpin	Cottus sp. 1	G2	S2	SOC		H		
	Vertebrate Animal	Bluestone Sculpin	Cottus sp. 1	G2	S2	SOC		H		
BLUESTONE RIVER AT FALLS MILLS SCU	Invertebrate Animal	Tennessee Heelsplitter	Lasmigona holstonia	G3	S1		LE	E		
BLUESTONE RIVER SCU	Invertebrate Animal	Teays River crayfish	Cambarus sciotensis	G5	S2S3			C		
Natural Heritage Resources within Search Radius										

Intersecting Predictive Models
Predictive Model Results

Reissuance of VPDES Individual Permit for Bluefield Westside WWTP



- Project Area
- Buffered Project Area
- NH Screening Features
- Conservation Site
- GLNHR
- SCU

1:51,637

0 0.425 0.85 1.7 mi

0 0.5 1 2 km

Quads: Bramwell

Counties: Tazewell

Company: Department of Environmental Quality

Lat/Long: 371539 / -811654

Douglas W. Domenech
Secretary of Natural Resources

David A. Johnson
Director

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

The project mapped as part of this report has been searched against the Department of Conservation and Recreation's Biotics Data System for occurrences of natural heritage resources from the area indicated for this project. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to the information currently in Biotics files, NATURAL HERITAGE RESOURCES HAVE BEEN DOCUMENTED within two miles of the indicated project boundaries and/or POTENTIAL HABITAT FOR NATURAL HERITAGE RESOURCES intersect the project area.

You have submitted this project to DCR for a more detailed review for potential impacts to natural heritage resources. DCR will review the submitted project to identify the specific natural heritage resources in the vicinity of the proposed project. Using the expertise of our biologists, DCR will evaluate whether your specific project is likely to impact these resources, and if so how. DCR's response will indicate whether any negative impacts are likely and, if so, make recommendations to avoid, minimize and/or mitigate these impacts. If the potential negative impacts are to species that are state- or federally-listed as threatened or endangered, DCR will also recommend coordination with the appropriate regulatory agencies: the Virginia Department of Game and Inland Fisheries for state-listed animals, the Virginia Department of Agriculture and Consumer Services for state-listed plants and insects, and the United States Fish and Wildlife Service for federally listed plants and animals. If your project is expected to have positive impacts we will report those to you with recommendations for enhancing these benefits.

There will be a charge for this service for "for profit companies": $60, plus an additional charge of $35 for 1-5 occurrences and $60 for 6 or more occurrences.

Please allow up to 30 days for a response, unless you requested a priority response (in 5 business days) at an additional surcharge of $500. An invoice will be provided with your response.

We will review the project based on the information you included in the Project Info submittal form, which is included in this report. Also any additional information including photographs, survey documents, etc. attached during the project submittal process and/or sent via email referencing the project title (from the first page of this report).

Thank you for submitting your project for review to the Virginia Natural Heritage Program through the NH Data Explorer. Should you have any questions or concerns about DCR, the Data Explorer, or this report, please contact the Natural Heritage Project Review Unit at 804-371-2708.

ATTACHMENT 8

PCB Minimization

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
SOUTHWEST REGIONAL OFFICE
355 Deadmore Street, PO Box 1688, Abingdon, Virginia 24212
Phone (276) 676-4800 Fax (276)676-4899
www.deq.virginia.gov

L. Preston Bryant, Jr.
Secretary of Natural Resources

David K. Paylor
Director

Dallas R. Sizemore
Regional Director

October 13, 2009

Mr. Ronald L. Dotson
Assistant Executive Director
The Sanitary Board of Bluefield
P.O. Box 998
Bluefield, WV 24701

Re: **VPDES Permit Number VA0025054, Bluefield Westside WWTP, PCB Pollutant Minimization Plan**

Dear Mr. Dotson:

We have reviewed and are approving the Pollutant Minimization Plan (PMP), received on September 22, 2009, which was submitted in accordance with PART I F.8. of the VPDES Permit.

We commend your efforts so far in working with EPA and it's contractors to inspect, evaluate, test and remove sources of PCB contamination. Your efforts so far have been confined to known, or highly suspect, sources of PCB contamination. However, you need to survey and inspect all industrial users, to determine if there are additional potential dischargers of PCBs. Attached is a list of industrial facilities by SIC code subject to PCB monitoring guidance.

The final report, to be submitted with the reissuance application during the fourth year of the permit term, should include an analysis of the success in locating, reducing, and eliminating sources of PCB in the collection system. The report should include all collected data and an analysis of the data. The report should also evaluate and recommend what additional or continuing investigation or testing for PCBs may be required.

If you wish to further discuss this matter, please feel free to contact me.

Sincerely,

Allen J. Newman, P.E.
Water Permit and Planning Manager

supported by adequate low-level PCB data obtained in accordance with method described in Appendix C and D, DEQ may still request monitoring to obtain the data. The decision will be case by case based on the needs of the TMDL.

- This guidance does not apply to municipal separate storm water systems permitted by DCR.

Specific types of industrial or commercial operations are more likely than others to have a discharge that includes PCBs. Therefore, industrial activities with primary or secondary Standard Industrial Classification ("SIC") codes identified in Table 1 are subject to this monitoring guidance. Other industrial facilities may be identified for monitoring based on additional information or recommendations of DEQ technical staff.

Table 1. Industrial facilities by SIC code subject to PCB monitoring guidance.

SIC Code	Code Name Facility	SIC Code	Code Name Facility
26 & 27	Paper and Allied Products	5093	Scrap recycling
30	Rubber and Misc. Plastics	1221 & 1222	Bituminous Coal
33	Primary Metal Industries	3612	Transformers
34	Fabricated Metal Products	3731 & 3732	Ship/Boat Building/Repair
37	Transportation Equipment	4011	Railroad Transportation
49	Electrical, Gas and Sanitary Services	5015	Automobile Salvage Yards

Once a PCB impaired segment appears on the TMDL development schedule, the regional TMDL coordinator is responsible for notifying the facility of data needs. If data for TMDL source characterization are not available through this effort, DEQ may request data by letter or amend a VPDES permit with special conditions (Appendix B).

B. Monitoring Frequency

The minimum monitoring frequency for facilities described in Section A is outlined in Table 2. For load characterization, both base flow (dry) and storm or high flow event (wet) sampling are recommended as described in Appendix C unless stated otherwise.

Table 2. Type of facility and minimum monitoring frequency recommended.

VPDES Facility				
Municipals		Industrials		
Major ≥ 1 MGD	Minor < 1 MGD	Process wastewater only	Process wastewater with storm water	Storm water only
2 wet + 2 dry	1 wet + 1 dry	2 samples (storm event sampling not required)	1 dry + 1 wet	2 wet

Dischargers subject to the monitoring guidance shall begin monitoring within one year of receipt of DEQ notification and conclude the monitoring within two years of receipt of the notification

Wyatt, Frederick (DEQ)

From: Trent, Mark (DEQ)
Sent: Monday, February 24, 2014 2:44 PM
To: Matthew.L.Sweeney@Wv.Gov
Cc: sbailey@bluefieldsanitary.org; Wyatt, Frederick (DEQ); Sells, Angela (DEQ); Newman, Allen (DEQ); Richards, Mark (DEQ)
Subject: VPDES Permit VA0025054; Bluefield Westside Wastewater Treatment Plant
Attachments: VA0025054 Bluefield Westside WWTP Comment Reponse Letter.pdf

TO: Matt Sweeney
West Virginia Department of Environmental Protection
Division of Water and Waste Management

Please find attached a *.pdf copy of correspondence sent to Scott Mandirola regarding the recent comments which WVDEP submitted for the proposed draft permit for the Bluefield Westside Wastewater Treatment Plant.

The original copy of the letter was sent via USPS.

Please let me know if you have any questions.

Mark S. Trent
Water Permit Manager
VA Department of Environmental Quality
Southwest Regional Office
355-A Deadmore Street
Abingdon, VA 24210
(276) 676-4816
mark.trent@deq.virginia.gov

COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
SOUTHWEST REGIONAL OFFICE
355-A Deadmore Street, Abingdon, Virginia 24210
Phone (276) 676-4800 Fax (276) 676-4899
www.deq.virginia.gov

Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

Allen J. Newman, P.E.
Regional Director

February 24, 2014

Scott G. Mandirola, Director
Division of Water and Waste Management
601 57th Street, SE
Charleston WV 25304

RE: VPDES Permit VA0025054; Bluefield Westside Wastewater Treatment Plant; Tazewell County, Virginia

Dear Mr. Mandirola:

On January 21, 2014, the DEQ Southwest Regional Office received your comments regarding the proposed reissuance of the VPDES permit for the Bluefield Westside Wastewater Treatment Plant in Bluefield, Virginia. The staff has reviewed the comments and determined that the provisions in the current draft permit are sufficiently protective of the water quality of the stream and comply with current accepted methods for addressing the presence of total PCBs (tPCB) in the waste stream. Therefore, the Department intends to issue the permit as initially proposed.

Past sampling of the discharge has documented the presence of tPCBs in the effluent. Therefore, in accordance with the procedures that the Department has adopted to address the presence of tPCBs in the waste stream, the proposed permit (Part I.F.12) contains requirements that the facility develop a Pollutant Minimization Plan (PMP) which will outline a plan of action to identify the location and potential reduction of tPCBs in their wastewater through backtracking.

Because the wastewater treatment operations implemented at the Bluefield Westside Wastewater Treatment Plant have removal efficiencies estimated to be in the range of 70-90% on concentrations of tPCBs, source reduction is the most effective means to obtain additional reductions of tPCBs in the effluent. Routine effluent monitoring provides no added value until additional investigation into the potential sources, and until additional source reduction measures are implemented in the watershed.

Under the provisions of the permit, the Sanitary Board of Bluefield must submit a PMP to the Department within 180 days of the effective date of the permit. The Department must approve the proposal prior to its implementation, and the staff will require a robust plan with definitive goals and an appropriate schedule of actions to ensure the facility continues to address the issue. The plan must also include additional monitoring both during dry weather and wet weather conditions. This data will allow

DEQ to measure the effectiveness of their minimization plan and provide data to allow DEQ to conduct a reasonable potential analysis upon subsequent permit actions.

This strategy to address tPCBs using a PMP approach is not unique. It is based on programs which have been successfully implemented by the Delaware River Basin Commission (DRBC) and associated states to address the Delaware Bay PCB TMDL. Upon approval, the plan and its schedule for implementation becomes an enforceable part of the VPDES permit, and will provide a structured mechanism with measurable goals and milestones.

We appreciate your agency's interest in this project, as we both share interest in returning the Bluestone River into full attainment of its designated use. As per your request, we will send you a copy of the final permit upon reissuance. We would gladly also share the approved PMP with your staff, because of the potential for the source reduction measures to be in the state of West Virgina.

If you have any questions regarding this determination, you may contact me at 276-676-4816, or by email at mark.trent@deq.virginia.gov .

Sincerely,

Mark S. Trent
Water Permit Manager
Southwest Regional Office

cc: Shannon L. Bailey, Sanitary Board of Bluefield (sbailey@bluefieldsanitary.org)
Matt Sweeney, WVDEP (Matthew.L.Sweeney@Wv.Gov)

THE SANITARY BOARD OF BLUEFIELD

OFFICE NUMBER
304-325-3681

P.O. BOX 998
BLUEFIELD, WEST VIRGINIA 24701

FAX NUMBER
304-325-6838

RECEIVED
FEB 0 3 2014
DEQ SWRO

January 31, 2014

Fred M. Wyatt
Water Permit Project Manager
Department of Environmental Quality
Southwest Regional Office
Abingdon, VA 24210

Re: VPDES Permit Number VA0025054
Comments on Draft Permit

Dear Mr. Wyatt:

The Sanitary Board of Bluefield has reviewed the comments dated January 29, 2014 from the State of West Virginia, Department of Environmental Protection (WVDEP), regarding the draft VPDES Permit Number VA0025054 for the Bluefield Westside Wastewater Treatment Plant (WWTP).

We share both DEQ's and the WVDEP's concerns regarding PCB impairment of the Bluestone River. We strongly believe that this contamination likely resulted from illegal legacy discharges from a private facility upstream, which USEPA addressed in the 2008-2009 time period.

Significantly, our most recent PCB result (June 2012: 1462 pg/L) is below our waste load allocation to the River. Nevertheless, we are willing to perform sampling to further characterize our PCB levels and to identify any potential hot spots in our collection system.

That said, PCB testing costs range from $800 - $2000 per test. This is a very expensive proposition for our utility, particularly where our recent sampling is below our waste load allocation. Given the cost of testing, we need to maximize the benefit of the information from any such sampling. Accordingly, we believe the draft permit establishes the smartest and most cost-effective approach by requiring a combination of collection-system targeted sampling with some end-of-pipe sampling. In particular, we think a primary focus on collection system sampling for this permit cycle will give us the best information from our PCB testing to try to identify and address any sources/hot spots in our collection system. Effluent monitoring will not provide any information about potential sources. Thus, for this permit cycle, we believe the permit as drafted will provide DEQ and the Sanitary Board with the best information about PCB sources in our system. Thus, we ask that DEQ retain the PCB monitoring program proposed in the draft permit for this permit cycle. We look forward to evaluating our results with DEQ and

DEP in advance of the next permit renewal so that we can revise our sampling regimen (to the extent further characterization for PCBs is necessary) so that it will continue to provide all of us with the best information possible.

Thank you for the opportunity to share our thoughts on the monitoring strategy for PCBs for this permit cycle. If you should have any questions, please do not hesitate to contact my office at your earliest convenience.

Sincerely,

Shannon L. Bailey
Executive Director

cc: Allen Newman, Regional Director
Virginia Department of Environmental Quality
355-A Deadmore Street
Abingdon, VA 24210

west virginia department of environmental protection

Division of Water and Waste Management
601 57th Street SE
Charleston, WV 25304
Phone: (304) 926-0495
Fax: (304) 926-0463

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

January 29, 2014

Fred M. Wyatt
Water Permit Project Manager
Department of Environmental Quality
Southwest Regional Office
Abingdon, VA 24210

CERTIFIED RETURN RECEIPT REQUESTED

Re: VPDES Permit Number VA0025054
Comments on Draft Permit

Dear Mr. Wyatt:

The State of West Virginia, Department of Environmental Protection (herein after "WVDEP") appreciates the opportunity to provide comments on draft VPDES Permit No. VA0025054 for the Bluefield Westside Wastewater Treatment Plant (BWWTP) that went to public notice on December 30, 2013.

Based on a review of the draft permit and fact sheet, the Virginia Department of Environmental Quality (VDEQ) has recognized the concerns with polychlorinated biphenyls (PCBs) in the Bluestone River as well as the discharge from the BWWTP. The WVDEP has reviewed both the *Draft 2012 305(b)/303(d) Water Quality Assessment Integrated Report* published by the VDEQ and *2012 Final West Virginia Integrated Water Quality Monitoring and Assessment Report* published by the WVDEP which identify that numerous miles of the Bluestone River are impaired for PCBs for either fish tissue or water column impacts including segments downstream of the BWWTP discharge and downstream segments in West Virginia.

WVDEP shares in the concern with PCBs in the Bluestone River as well as the PCB discharge levels from the BWWTP and its potential downstream impacts in the State of West Virginia. The WVDEP recommends, at a minimum, that routine effluent monitoring for PCBs be imposed in Section A of the subject permit on a quarterly basis for Outlet 001. The WVDEP believes that this data would aid in fully characterizing pollutant loadings in the discharge. This data would prove beneficial for future TMDL development for PCBs in both Virginia and West Virginia for the Bluestone River. Additionally, this data would also serve in establishing baseline pollutant levels in the discharge, aid in determining future reductions in pollutant levels in the discharge due to any source reductions, and ultimately serve to determine the effectiveness of the Pollutant Minimization Plan prescribed in the draft permit.

The WVDEP thanks you for the opportunity to provide comments on draft VPDES Permit No. VA0025054 for the BWWTP. The agency would like to formally request a copy of the final permit upon issuance. If you should have any questions, please contact Matt Sweeney, P.E. at (304) 926-0499, extension 1019.

Sincerely,

Scott G. Mandirola
Director

SGM:mls

cc: Allen Newman, Regional Director
Virginia Department of Environmental Quality
355-A Deadmore Street
Abingdon, Virginia 24210

Jon Capacasa, Director
US EPA Region 3
Water Protection Division (3WP00)
1650 Arch Street
Philadelphia, PA 19103-2029

Wyatt, Frederick (DEQ)

From: Shannon Bailey [sbailey@bluefieldsanitary.org]
Sent: Friday, January 31, 2014 12:55 PM
To: Trent, Mark (DEQ)
Cc: Wyatt, Frederick (DEQ); Newman, Allen (DEQ)
Subject: Re: FW: Comments on Draft VPDES Permit No. VA0025054
Attachments: Draft Permit Comments BSB 2014 - Jan 31.docx

Mr. Trent and Mr. Wyatt,

Please find attached the comments from The Sanitary Board of Bluefield in regards to the referenced WVDEP comment letter. Thank you for sharing these comments with us and allowing us an opportunity to respond. I have placed the hard copies in the mail for your files.

If you need any further information, please do not hesitate to contact my office.

Sincerely,

On Thu, Jan 30, 2014 at 9:29 AM, Trent, Mark (DEQ) <Mark.Trent@deq.virginia.gov> wrote:

To: Shannon Bailey, Executive Director

(sbailey@bluefieldsanitary.org)

The Sanitary Board of Bluefield

Attached for your review is a copy of comments received from the West Virginia Department of Environmental Protection regarding the proposed draft permit for the Bluefield Westside Wastewater Treatment Plant. The WVDEP has requested that DEQ require quarterly effluent monitoring for PCB's at the outfall from the BWWTP in order to aid in the characterization of pollutants in the discharge.

The VA DEQ considers all comments in the development of its permits, and will evaluate these comments with respect to our regulatory requirements. Our final permit decision will be made only after full consideration of all comments received during the public comment period.

I am sending you these comments in order to give the Sanitary Board of Bluefield an opportunity to provide input which may assist the VADEQ in our response to the recommendation.

Please keep in mind that the expiration date of the existing permit is March 23, 2014. Therefore, please give this matter your immediate attention.

If you have any questions, you may contact me at the addresses listed below:

Mark S. Trent
Water Permit Manager

VA Department of Environmental Quality
Southwest Regional Office
355-A Deadmore Street

Abingdon, VA 24210
(276) 676-4816
mark.trent@deq.virginia.gov

From: Wyatt, Frederick (DEQ)
Sent: Thursday, January 30, 2014 7:51 AM
To: Trent, Mark (DEQ); Newman, Allen (DEQ); Lott, Craig (DEQ); Richards, Mark (DEQ)
Subject: FW: Comments on Draft VPDES Permit No. VA0025054

Attached are West Virginia's comments on Bluefield.

From: Sweeney, Matthew L [mailto:Matthew.L.Sweeney@wv.gov]
Sent: Wednesday, January 29, 2014 4:58 PM
To: Wyatt, Frederick (DEQ)
Cc: Mandirola, Scott G; Patel, Yogesh P
Subject: Comments on Draft VPDES Permit No. VA0025054

Mr. Wyatt,

Please find an attached comment letter from the WVDEP for Draft VPDES Permit No. VA0025054. An original copy will follow in the mail. Feel free to contact me with any questions.

Thanks,

Matt Sweeney, P.E.

NPDES Individual Permitting Supervisor

WV Department of Environmental Protection

Division of Water and Waste Management

601 57th Street, SE

Charleston, WV 25304

(304) 926-0495

--

Mr. Shannon Bailey
The Sanitary Board of Bluefield
Executive Director
100 Rogers Street
Bluefield, WV 24701
www.bluefieldsanitary.org
Phone: 304-325-3681
Fax: 304-325-6838

Wyatt, Frederick (DEQ)

From: Sweeney, Matthew L [Matthew.L.Sweeney@wv.gov]
Sent: Wednesday, January 29, 2014 4:58 PM
To: Wyatt, Frederick (DEQ)
Cc: Mandirola, Scott G; Patel, Yogesh P
Subject: Comments on Draft VPDES Permit No. VA0025054
Attachments: SKMBT_65414012917550.pdf

Mr. Wyatt,

Please find an attached comment letter from the WVDEP for Draft VPDES Permit No. VA0025054. An original copy will follow in the mail. Feel free to contact me with any questions.

Thanks,

Matt Sweeney, P.E.
NPDES Individual Permitting Supervisor
WV Department of Environmental Protection
Division of Water and Waste Management
601 57th Street, SE
Charleston, WV 25304
(304) 926-0495

Wyatt, Frederick (DEQ)

From: Chapman, Martha (DEQ)
Sent: Friday, December 06, 2013 2:47 PM
To: Wyatt, Frederick (DEQ)
Subject: FW: Bluefield PMP
Attachments: 2011_1 Revised PMP_FINAL.pdf

-----Original Message-----
From: Richards, Mark (DEQ)
Sent: Friday, December 06, 2013 10:35 AM
To: Chapman, Martha (DEQ)
Subject: RE: Bluefield PMP

Martha,

It sounds like an actual plan exists. The question is, "what has been done besides working with EPA"?

Attached is an example of an approved PMP for the Town of Altavista on the Roanoke R. The PMP needs to have an objective with clear iterative goals. These are also predicated on Adaptive Implementation recognizing no two facilities/situations are the same. I'm surprised they have even gone down this path yet without a TMDL (although the WLA is a standard calculation using the WQC x design flow x conversion factor).

Mark

-----Original Message-----
From: Chapman, Martha (DEQ)
Sent: Friday, December 06, 2013 10:25 AM
To: Richards, Mark (DEQ)
Subject: FW: Bluefield PMP

Mark,
I'm guessing this will probably be insufficient, especially since it is really just a letter.
Please read over it and let me know where you think we should go from here.

Thanks,
Martha

-----Original Message-----
From: abingdnscan@deq.virginia.gov [mailto:abingdnscan@deq.virginia.gov]
Sent: Friday, December 06, 2013 9:07 AM
To: Chapman, Martha (DEQ)
Subject: scan from copier

TASKalfa 4500i
[00:c0:ee:86:a8:73]

Wyatt, Frederick (DEQ)

From: Richards, Mark (DEQ)
Sent: Thursday, October 24, 2013 1:50 PM
To: Chapman, Martha (DEQ); Wyatt, Frederick (DEQ)
Subject: FW: Bluestone data
Attachments: Final PMP Special Condition.pdf

Hi Martha/Fred

Actually I found 2 SPMD results:

1) March/April 2004 - 640 pg/L
2) Jan 2005 – 3,972 pg/L

With the sample collected under dry condition in June 2012 **(1,462 pg/L),** we probably have enough to know that the facility will exceed a TMDL assigned WLA where the PCB WQC must be met at the end of pipe. The Bluestone Plant Operator said EPA collected a sample under a Wet condition – I don't have the result, however. I don't see the need to generate additional data unless the SPMD data are not accepted (I can't think of a reason to exclude).

The next step would to go into a Pollutant Minimization Plan. Since we don't have a TMDL yet, the PMP would be predicated on TMDL completion unless they wanted to start PCB source trackdown early. I have provided an example of a permit special condition developed by NRO to address their facilities that exceed the WLA. Obviously this would have to be modified for Bluefield if incorporated into their permit.

Please let me know if you have questions.
Mark

From: Richards, Mark (DEQ)
Sent: Thursday, October 24, 2013 10:38 AM
To: Chapman, Martha (DEQ)
Cc: Wyatt, Frederick (DEQ)
Subject: Bluestone data

Hi Martha,

I have a lot of data in my files as well. At some point we will have to compare. Currently, to help out Fred with the Permit reissuance, other than an SPMD sample collected in the '04-'05 timeframe, do you know if the Bluefield WWTP has collected any other PCB data from their final effluent? I have the SPMD result and the 6/12/2013 result (Total PCB = 1,452 pg/L) – exceeds WQC of 640 pg/L.

Our guidance requests a total of 4 samples – 2 wet weather and 2 dry weather. I have asked Fred to ask Bluefield what the weather condition was for the 6/12/2013 sample.

Thanks!

Mark

mark.richards@deq.virginia.gov

Mark A. Richards

Office of Watershed Programs
Department of Environmental Quality
629 East Main St.
Richmond, VA 23219
(804) 698-4392
http://www.deq.virginia.gov/Programs/Water/WaterQualityInformationTMDLs/TMDL.aspx